HOW DID MEDIEVAL CARTOGRAPHERS WORK?

New insights through a systematic analysis of the visual language of medieval portolan charts up to 1439

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Introduction

There were two main traditions for depicting the world in the Middle Ages: Mappae Mundi and portolan charts. Each portolan chart has a sophisticated system of signs, its visual language. This system consists of different groups of signs, starting with nautical signs, such as scales, the rhumb-line-system and visualisation of winds; geographical signs for hills, mountains, lakes and rivers; conventional architectural signs for cities, castles and churches; the depiction of places with an individual iconographic tradition like Jerusalem or the tower of Babel; and finally signs indicating rule like flags, coats of arms and insignia (fig. 1).

A fundamental problem in the history of medieval cartography is the lack of written sources supplying information about the conditions of production, reception and usage. Did cartographers work collectively or individually? Did they use complete charts as prototypes or catalogues of symbols? Was the work shared between a cartographer responsible for the coastlines and an illuminator for the graphical signs? What was the relationship between the different places of production and how did they develop? Due to the lack of written sources, a new method has to be applied to achieve further results. Thus this approach focuses on a comparative analysis of the visual language of the charts with its thousands of signs of different types. Treating the system of graphical signs as a written language, its dictionary and its grammar can be analysed comparatively, revealing a relationship to the cartographer, the production date and the place of production. The results throw a new light on medieval portolan charts, cartographers, cartographic schools and the development of marine cartography up to 1440.

Les sources écrites ne nous donnent presque aucune information sur la manière dont les cartes portulans médiévales étaient réalisées. Les cartographes travaillaient-ils collectivement ou individuellement ? Utilisaient-ils des cartes entières comme prototypes ou plutôt des catalogues de symboles ? Le travail était-il partagé entre un cartographe responsable du dessin des côtes et un enlumineur spécialisé dans les signes graphiques ? Quelle était la relation entre les différents lieux de production et comment se développèrent-ils ? Face aux lacunes des sources écrites, une nouvelle méthode a été appliquée pour répondre à ces questions. Notre approche consiste en une analyse comparée du langage visuel des cartes, par l’étude des milliers de signes de différentes natures dont elles sont couvertes. En analysant le système des signes graphiques à la manière d’un texte, son vocabulaire et sa grammaire peuvent faire l’objet d’une analyse comparée, établissant une relation entre un cartographe, une date et un lieu de production. Les résultats éclairent sous un jour nouveau les cartes portulans médiévales, les cartographes et les écoles cartographiques, ainsi que le développement de la cartographie jusqu’à 1440.

1 Campbell, 1987; Pujades i Bataller, 2007.
that one aspect that contains the most information has not been systematically investigated. The visual language, the totality of all graphical signs, is an underused potential source of knowledge. An exact and comprehensive analysis can provide fresh findings about the emergence, development and relationship of medieval portolan charts. This new information invites a revaluation of the cultural and historical impact of the cartographic workshops in Venice, Genoa and Mallorca. An extensive attempt to carry out such an investigation was recently undertaken by the author of this paper.

How does this new approach illustrate the practical details of the production process? I will give an example. One of the main questions is whether prototypes were used, whether for charts as a whole, the graphical signs or specific groups of signs. This could easily be proved with an analysis of the graphical signs. If complete charts were used as prototypes, the charts would be identical in all details. If catalogues of signs were used, then single classes of signs would be completely identical, while others might be different.

2 From the earliest times until 1311

I will present my results in a chronological order. The analysis of the visual language leads to a three-phase model for the development of portolan charts up to 1439. The earliest period (until 1311) is the time of fragmentarily delivered early charts. Cosmological content, like the wind personifications on the Lucca chart, shows that two of the three earliest charts were used in the context of an urban culture of knowledge (the Pisa chart (Ms., BNF, Département des Cartes et Plans, B 1118.), the Lucca chart (Ms., Lucca, Archivio di Stato, Fragmenta Codicum, Sala 40, Cornice 194/I, fig. 2; I date this map before 1327) and the Cortona Chart (Ms., Cortona, Biblioteca del Comune e dell’Accademia Etrusca, Port. 150). The precise origins of the earliest charts cannot be determined, although middle or northern Italy seems likely. The analysis of the earliest wind names shows that there are traces of reciprocal and intercultural influence from different regions. As a result, theories of early production places isolated from each other can be disproved. Sadly the density of sources is too low for a comparative analysis of the conditions of production, but it is clear that the earliest charts cannot be seen as being in a direct line with later traditions.

3 The time of interregional iconographic traditions (1311-1373)

3.1 Vesconte family

The second phase starts with the earliest charts of the Venetian Vesconte family and ends around 1373 with the establishment of local cartographic schools. It is characterised by the existence of interregional iconographic traditions. The design and concepts behind the signs were exchanged all over the Mediterranean. The visual language of the early Vesconte family shows a perfect symbiosis of illumination and cartography. These cartographers established the initial design for many classes of signs, which was to be used for centuries. They also added an ornamental component to the design of many nautical signs (fig. 3).

In general, the Vesconte charts show a very dynamic development in their visual language. Rhumb-line-systems, wind signs and heraldic signs developed rapidly with every chart. Thus, hardly any general conclusions about the methods of production can be made. If you compare the atlases of Pietro and Perrino Vesconte, it seems possible that the corner illustrations were made by a professional illustrator. They are completely independent from the geographical content of the charts and they show the same characteristics, regardless of the artist who signed the chart.

3.2 Angelino Dalorto / Dulcert

Comparing the charts of Angelino Dalorto and Angelino Dulcert, it seems most likely that there was one person behind these two names. An analysis of contemporary cartography indicates that only charts produced by the same person can show such coherence in graphical characteristics and visualisation strategies. As a further result we can say that Dalorto used neither an illustrator nor a catalogue of prototypes. Resulting from a comparative analysis of the visual language of all Dalorto/Dulcert charts, we find numerous indications that cartographers used charts of the previous generation as each chart served as a model for the next. The charts of Dalorto cannot be interpreted as prototypes or early examples of the Mallorcan school of cartography for three reasons. First, graphical characteristics of the later Mallorcan school were widely spread during the second half of

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3 Billion, 2011b.
4 Armignacco, 1957.
5 Billion, 2011a.
3.3 Venetian utilitarian cartography of the 14th century

Four 14th century charts without signature and location show similar graphical characteristics\(^7\). Their visual language makes a dating between the 1330s and the 1360s possible and an attribution to Venice as a place of production likely. These charts can be interpreted as products of a Venetian workshop that produced utilitarian charts for purely nautical use. There are four reasons for this thesis: first such a degree of similarity in the graphical characteristics can only be explained in terms of production by one person or one workshop. Secondly, the charts differ very little in their graphical characteristics. There is no improvement or development in the design. Thirdly, none of the charts shows ornamental graphical elements. Finally, none of them has a signature, although two charts are complete. So the signatures were not lost, but never included. If a chart gains value through its benefit for navigation, a signature is not necessary.

Looking at the conditions of production, the system of graphical signs was obviously copied from a common prototype chart. In the middle of the 14th century, pestilence and wars may have lowered the demand for luxurious charts in Venice and led to a more down-market cartographic production. This might be the reason for the existence of a workshop of utilitarian charts in that city at that time. The uniformity of production shows no traces of any influence of the client’s wishes or values on the modernity of the graphical signs. The existence of such a workshop was presumed, but hitherto could not be proved.

4 The cartographic schools after 1373

The third phase starts in 1375 and is characterised by the dependence of the visual language of charts on the place of production. In parallel with the free exchange of toponyms until 1375, there had been a sharing of visual elements\(^10\). In Venice, Genoa and Mallorca the mode of production had fundamentally changed. From that time on, we can speak about place-bound cartographic schools.

4.1 Mallorcan school

Twelve works can be attributed to the Mallorcan school, starting with the Catalan Atlas from 1375 (BNF, Département des Manuscrits, Ms. Esp. 30)\(^11\).

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7 Ms., Paris, BNF, Département des Manuscrits, Ms. Ital. 1704; Ms., Washington, Library of Congress, Ristow & Skelton 3; Ms., Barcelona, Arxiu de la Corona d’Arago, MP-1; A chart that was auctioned in 1992 (Campbell, 1986, Nr. 177).
8 Billion 2011a.
10 Relaño, 2002; Campbell, 1987.
11 Yoeli, 1970; Pujades i Bataller, 2005; Billion 2011a.
The characteristic features are a complete open rhumb-line-system with only one primary centre, rivers as coloured lines shown in their full extent, mountain ranges in characteristic standardised forms, heraldic signs, conventional signs for cities and a number of cities and places with individual iconographic traditions (e.g. Jerusalem or Noah’s Ark).

The Mallorcan world is an urban world. Cities are the primary reference points. Only rivers, lakes and mountains exist between them, while lesser levels of urban culture are not represented at all. Space for exotic people, animals, and plants as well as details of historical, mythical and ethnological information was left in the extreme North and South. Flags are always based on urban signs. The cultural depth of this school is exemplified by the well balanced harmony of graphical signs, its symbiotic information networks, as well as complex concepts of rule, urbanity and culture (fig. 5).

Mallorcan cartographers of the workshop of the Catalan world chart produced a wide spectrum of charts, from monumental circled world maps to simple nautical charts. This analysis shows how obsolete the separation between ‘functional’ portolan charts and ‘cosmological’ Mappae Mundi is.

We can attribute to the workshop of the Catalan Atlas one large chart (Ms., Naples, Biblioteca Nazionale di Napoli Vittorio Emanuele III, Sala dei Manoscritti 8.2), a fragment of a huge round world chart (Ms., Istanbul, Topkapi Sarayi, 1828 (49361 / 2758)), and the famous Catalan Atlas itself. To achieve an understanding of the techniques of production, we should compare the Far East on the fragment with the same region on the Catalan Atlas. As an example of the great similarities, the fragments of the far eastern caravan fit perfectly when the two versions are superimposed (fig. 6)\(^{12}\).

When we complete the rim of the earth on the fragment we arrive at the original size of the world chart. We can now attach the sheets of the Catalan Atlas with as much coverage as possible and take a look at the Far East. If we project the reconstructed rim of the earth onto the easternmost chart of the atlas, we can see a strong graphical correlation (fig. 7). What can we learn from this? To me, it seems very likely that the Catalan Atlas was taken from a prototype in the form of a huge round world chart.

For another series of world charts we only have documentary proof and no cartographic evidence. A contract between the Florentine diamond and ivory trader Baldassare degli Ubiacci from 1399 and 1400 provides details about the work of contemporary cartographers. Baldassare orders several large scale world charts from Francesco Beccari of Genova and Jafudà, the son of Abraham Cresques\(^{13}\). First, a smaller prototype with only 242 signs was to be produced, while the final versions were to have 770 signs each. The text contains a detailed list of signs in different classes, such as people, animals, ships, trees and flags that had to be illuminated by Beccari. The production process is well defined here. Jafudà was supposed to draw the underlying hydrographical chart and further graphical elements that are not described in details in the document. Then an envoy was to collect those charts and take them to Francesco Beccari for illustration.

What can we learn about the production process of medieval portolan charts? First, we can prove that the client had a considerable influence on the visual language of the charts. He decided about those details of the graphic design that were fixed in the contract. By contrast, the hydrography is not described there at all. Secondly, a prototype chart is produced. The creation of a small prototype chart was required so obviously such a prototype did not exist at the time of the order. Finally, the material used had to be paid separately depending on the value of ink, the parchment, etc.

This text has often been interpreted as proof of collaboration between a cartographer filling in the coastlines and an illustrator drawing all the more sophisticated signs. This interpretation is wrong, as an exact analysis of the text shows. A new interpretation of distinct passages shows that the work was divided between one cartographer who drew the coastlines and provided the texts, scales, rhumb-line-system, visualisation of the winds, mountains, lakes, oceans and architectural signs, while the other person drew the flags and pictorial elements\(^{14}\).

The flowering of the Mallorcan school ended with the turn of the 15th century. All later works of the Viladestes and Valsecha families show a significant loss of encoded information in geographical, ethnological and bio-geographical details. The low density of surviving charts does not allow a comparative

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12 Billion, 2011a.
13 Skelton, 1968.
14 Billion, 2011a.
study of the production conditions of the late Mallorcan school. From 1440 on, the visual language of Mallorca charts withered to formal art, copying iconographical traditions without understanding. This development might have been a late effect of the pogrom against the Jewish Ghetto in Ciutat de Mallorca [Palma] in 1391. It seems likely that the religious and cultural information that was shown on the charts of the Mallorcan school was transported by wide networks of Jewish traders. Now that these networks had broken down, the Mallorcan school lost its source of information and degenerated into simply copying charts from the more innovative time of this school’s heyday.

4.2 The Venetian school

The Venetian school shows a totally different concept of visualisation. Signs of rule and urbanity are completely missing. However, they are not simply undorned copies of Mallorcan charts, but have a distinct visual language with ornamental features. These characteristics are integrated into nautical and hydrographical signs like the rhumb-line-system with its strict and clear symmetry leading to a balanced graphical harmony. The most significant feature of the Venetian school is the construction of geographical characteristics such as mountains, rivers and lakes as basic geometrical figures. These strictly symmetrical outlines are an aesthetic counterweight to the fractal coastlines with their confusing forms (fig. 8).

Only in Venice can we trace the process of creating a set of canonical signs by a cartographic school. The key to understanding the development of the Venetian school is the almost unknown chart of the Museo Correr, dated with the visual language and the palaeography between 1367 and 1385 (Ms., Venice, Museo Correr, Biblioteca, Portolano 40). Besides continuity with the contemporary Pizzigano family, the chart’s visual language shows characteristics of the Arabic 10th century Balkhi school (fig. 9). Regarding the whole system of graphical signs, this chart can be interpreted as the missing link between the interregional style of the time before 1375 and the local Venetian style influenced by contemporary Arabic cartography.

How did this school work? To investigate this question, I will analyze the Rhône River from its source to its estuary on charts of different Venetian cartographers from 1408 to 1443 (fig. 10). The river originates in Lake Geneva, and flows in a bow southwards into the Mediterranean near Arles. The lake has an iconography like a mandorla, and the estuary mouth is always displayed as a delta with islands. The similarities are so significant that they can only be explained by the use of a common prototype.

Let us now take a look at the people who signed these charts and their volume of production. With four atlases and two single charts up to 1440, Giacomo Giroldi’s production significantly exceeds that of any Mallorcan cartographer. And we have to keep in mind that he was a ship-owner and a cartographic amateur. We find the same when we look at Albertin da Virga and Francesco de Cesanis. If you compare their biographical data with the conditions of production, it seems highly implausible that the person whose signature it bears had actually produced it. Was cartography really a hobby for those Venetian seamen and were these charts products of their free time? This is hardly possible. It seems more likely that the charts were made by now unknown professional cartographers while the captains and ship owners who are named as authors may have had influence only on limited aspects of the production process. I want to summarise four arguments to support this thesis: first the contrast between the biographical data of the ostensible authors and the perfection of the charts in every respect. Second, all charts are so similar that they can hardly have been made by different people who were not at least working in one workshop. They cannot be the products of amateurs. Third, none of those cartographers was followed in his profession by a relative. Unlike the professional cartographers of the Mallorcan school, the Vesconte family and the Pizzigano family, not a single Venetian chartmaker is known to have passed on his business to a family member. Fourth, the use of Venetian charts can be demonstrated in Genoa and North Africa. Ramon Pujades i Bataller correctly said that this is inconsistent with the suggestion that Venetian chart production was a hobby of captains. Finally the use of prototypes in common workshops was a well known practice in medieval Venice. We can prove its usage in the 14th century Vesconte workshop for simple charts designed for nautical use.

4.3 Genoese school

The latest of the three schools, that of Genoa, is closely connected with the Beccari family. This school started as late as the early 15th century and ended

15 Morosini Gattersburg 469, ex 38.
16 Billion, 2011a.
17 Falchetta, 1995.
around 1437. We can attribute five charts with the distinctive characteristic of an open rhumb-line-system with exactly six tertiary centres in constant configuration. Its characteristic feature is the depiction of only a small canon of cities as detailed and realistic architectural compositions in a perspective view. Heraldic signs are treated as accessories for architecture.

How were charts made in this school? If we compare the few charts we have, all indicators lead us towards a dynamical development with every chart. No prototypes were used, and each chart was a more or less exact copy of the predecessor.

Let us now come to a conclusion from all these results. A comparative analysis of the visual languages of medieval portolan charts provides a new perspective on the conditions of their production. A variety of production modes was used. An analysis of the charts of the Vesconte family leads us to the notion that the illustrations of the atlases could have been made by a professional illustrator. Dalorto/Dulcert used neither an illustrator nor a catalogue of prototypes. It seems that each chart served as a model for the next in a chain procession, so that particular conventions were reused and further developed from one to the next. The graphical signs on the unadorned nautical charts of the early Venetian workshop were obviously copied from a common prototype. In contrast to this, it has been shown that the Pizzigano family used a prototype catalogue for signs. Comparing the Istanbul chart fragment and the extreme east of the Catalan Atlas shows that charts of this workshop were copied from a huge circle world chart, while the later Mallorcan school and the school of Genoa developed charts in the same manner as Dalorto/Dulcert. An additional written source, a contract, provides details about the work of contemporary cartographers. The work was split between one cartographer who drew the coastlines and a framework of coastlines, texts, scales, rhumb-line-system, visualisation of the winds, mountains, lakes, oceans and architectural signs, and another person who drew the flags and pictorial elements. Catalogues of prototypes were used as well as a model with a reduced number of signs. The contract also shows the strong influence of the patron on the chart’s visual language.

Conclusion: the schools compared

Finally, I want to broaden the viewpoint with a comparison between the two great cartographic schools of the Middle Ages. Hitherto it has been claimed that typical Mallorcan school charts were richly ornamented, while Venetian charts were simple and unadorned. This judgement can be refuted. In fact, it can be proved that both cartographic schools had the same degree of ornamental functionality, and that both schools included information beyond the bare nautical requirements. Both schools, the Venetian and the Mallorcan, used graphical systems to interpret cosmological knowledge, although they did so in completely different ways.

In contrast to the Venetian school, whose comprehensive production started in the early 15th century, the school of Mallorca was already in decline at the end of the 14th century. It is not correct to assume a long term Mallorcan dominance of the chart market in the Middle Ages. In 15th century Mallorca, the visual language lost its deeper meaning and degenerated into pure decoration.

From the differences between surviving charts, the number of known cartographers and the quality of the cartographic production, we can conclude that the centre of mapmaking moved in the early 15th century from the city of Palma to Venice. Up to at least 1440, the Mallorcan school was on the fringes. During this period, Venetian cartography was more creative and productive in every respect. The most significant example of the necessity for this re-evaluation of the schools is the earliest evidence of a compass rose. The oldest compass rose is not found on the Catalan world atlas, as the traditional view would have it, but on a Venetian chart likely to have been made before 1367 (Kamal Y., 1926-1951, Nr. 1206). Venetian charts did not display knowledge about foreign countries at the border of the known world, but a discrete physical-geographical image of the Mediterranean. The ornamental effect of these strange, technical and artificial physical structures was discovered and used by Venetian cartographers. The lexicon of the graphical signs changed from a purely technical to a combined technical and ornamental function. More than any other people of the cities around the Mediterranean, Venetians were professional traders, observers, diplomats and discoverers. The economic, political and strategic successes of the Venetian state were based on the ability to plan geo-strategical operations. Therefore it seems highly unlikely that Venetian nautical charts were simple, inartificial objects of utility.
Bibliographie


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Figure 1: Typical signs on a medieval portolan chart, Battista Beccari, 1426 (Ms., Munich, Bayerische Staatsbibliothek, Cod Icon 30).
Figure 2: The Lucca chart (Ms., Lucca, Archivio di Stato, Fragmenta Codicum, Sala 40, Cornice 194/I)

Figure 3: A typical chart of the Vesconte family, Pietro Vesconte, 1320 (Ms., Rome, Vatican Library, Pal. Lat. 1362A)
Figure 4: The Campanile of Venice on different maps of the Pizzigano family (Ms., Parma, Biblioteca Palatina, Ms. Parm. 1612; the undated and now lost chart formerly in the property of Youssouf Kamal; Ms., Venice, Museo Correr, Biblioteca, Portolano 30)

Figure 5: The Middle East and India on the Catalan Atlas with typical characteristics of the Catalan school (Ms., Paris, BnF, Département des Manuscrits, Ms. Esp. 30)
Figure 6: Superimposition of the Istanbul fragment on the corresponding part of the Catalan Atlas
(Ms., Istanbul, Topkapı Sarayı, 1828 (49361/2758))
Figure 7: Projection of the rim of the earth of the Istanbul fragment on the Catalan Atlas (Ms., Paris, BnF, Département des Manuscrits, Ms. Esp. 30)

Figure 8: The Black Sea on a chart of Giacomo Giroldi, ca. 1422-1443 (Ms., London, British Library, Department of Manuscripts, Ms. 18665)
Figure 9: The Lunae Montes and the Nile on a chart of the Pizzigano family or their environment (Ms., Venice, Museo Correr, Biblioteca, Portolano 40 (Morosini Gattersburg 469, ex 38))

Figure 10: The Rhône river on different charts of the Venetian school (Nicolò Nicolai, 1448, Giacomo Giroldi 1426, Giacomo Giroldi attributed, ca. 1422-1443, Andrea Bianco 1436, Giacomo Giroldi 1443)