Between Creator and Reader: Towards Communicative Maps

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ABSTRACT

GIS technology has elevated the role maps play in re-enforcing and contradicting theories throughout the process of archaeological interpretation. Both as a data management and data presentation tool GIS influences, liberates and constrains the way we collect and use data. Maps are built, discussed and fine-tuned to achieve the best possible results but this dialogue frequently occurs in private and without the knowledge or experience of the fields of graphic design and cartography or the intended audience. As archaeologists, not graphic designers or cartographers, we have all produced maps for publications and presentations that fail to do justice to the time and effort spent collecting and organising that data. With all of this time spent gathering, validating and interpreting, why does the final map produced so often look to be an afterthought? This paper will discuss many of the barriers that prevent the audience from understanding the maps. A weblog of maps is available at http://www.archaeologymaps.blogspot.com to encourage dialogue about map production between colleagues, other archaeologists and the broader mapmaking, graphic and information design community. By creating a forum for discussion we and others will be able to create more effective maps.

1. INTRODUCTION

In the past map production was a difficult, time consuming task that required specialised skills. This is not entirely still the case, computer software like CAD and GIS make it possible for a broader range of users to produce maps. Many of these maps are being produced without any knowledge of cartography, graphic or information design, resulting in maps that fail to communicate with their intended audience. This paper will look at a few characteristics of cartography, information and graphic design and discuss how maps can be improved by applying these techniques.

Maps and mapmaking needs to be taken more seriously. It is unacceptable to produce maps as an afterthought to support points being made in the text. The ease of production allows for maps to be used to influence analysis not simply support arguments. The audience needs to know that they will need to invest time analysing maps and although a particular map may be complicated the information is being presented clearly. An audience must be fostered that invests time reading maps and being critical of the information, it must be clear why the maps are important to the analysis.

2. CARTOGRAPHIC DEMOCRATISATION

Today there is an ever-growing group of people learning to use cartographic and Geographic Information Systems software. This does not mean that they are learning to make maps. The ability to use the software does not guarantee that good maps will be produced. However, this problem is outweighed by the advantages of having so many different mapping voices participating in map production. Most of these users will never become cartographers and neither should they but this does not mean that they can be excused from not being familiar with at least a few cartographic and graphic design principles. If this is done, not only will better maps be produced, but they will also make a better audience, an audience capable of understanding and being critical of more complicated maps.

From this increasing pool of mapmakers rises an increasing amount of mapping voices. Maps are powerful visual tools, when made effectively they create a reality that goes beyond our senses (Wood and Fels, 1993, p. 7). For example, the numbers of artefacts recorded in the field can become spatial relationships between these artefacts and other archaeological elements, relationships that may not be perceived any other way.

Every map has an agenda and with more mapmakers, more and different mapping agendas. The map agenda needs to be clearly understood and most importantly the data must be capable of meeting that agenda. A single map is only one of an endless possibilities of maps that can be created with the same data (Monmonier, 1996, p. 2). A map is the vessel that carries an agenda and information to an audience; if the argument is going to convince, the audience must be able to understand the map.

3. TOWARDS COMMUNICATIVE MAPS

Planning a map starts with three elements: understanding the data, understanding the audience and then these two elements come together to create the purpose of the map. As with writing text the mapmaking process requires "careful thought and conscientious editing and rethinking" (Monmonier, 1993, p. X). The data that is being mapped deserves this level of attention; too much time is spent in the field collecting data for the maps to be rushed and sloppy.

For a map to be effective, an understanding of the capabilities of the data needs to be determined. What is the agenda of the map? By establishing the agenda of the map it is then possible to understand the maps priorities. It is important at this stage to determine that the data is able to demonstrate the intended point. From this understanding of the maps priorities it is possible to begin to determine what information is necessary and what information can be left out. Far

too often maps have information that is spurious, distracting the audience from the real purpose. Eduard Imhof, a Swiss cartography describes cartography as, "the art of moderation" (Imhof and Steward, 1982, p. 328), this "moderation" needs to begin in the planning stages. If restraint is practiced early in the mapmaking process it will be much easier to ensure the effectiveness of the map.

Moderation can be assisted by understanding who the audience is for a particular map. A maps purpose does not have a separate existence from the intended audience; maps assume the audience has a certain amount of knowledge. This could be as simple as knowing the general location of the United Kingdom or it can be as complex as assuming familiarity with the general topography. Frequently, we expect the audience to have this knowledge from other maps that are intended for this purpose. We do this all of the time when using a general location map to show where the area of interest is in relation to country boundaries at the beginning of the discussion, later when showing a more detailed map we are assuming the audience knows that this is within those boundaries established on the earlier map. It is vital that we make these assumptions, as maps require a limited scope, whether fine or coarse.

When determining the information that will be included in a map it might help to break the types of details on a map into two categories, content and context. Think of content as the collected archaeological data. Context is the rest of the information, the topography or geographic features among others that relate to the archaeology. This distinction is important for understanding how we construct archaeological maps. When these two elements are not dealt with effectively it can create an obstacle between the reader and the information. However, when treated effectively the reader is able to understand the map and it can support ones argument. When considering the relationship between these two elements it is important to be aware of what information is the most important, typically this will be the content. Often maps present the content of the map in such a way that it cannot escape the context. It is the context that attracts the audience's attention but this issue will be discussed in more detail later when discussing colour.

When thinking about presenting the data it is important that the way this is done does not end up misrepresenting the data. One of the common ways that this can be done is by arbitrarily or uncritically selecting break-values. Break-values are used to determine when a new shade or size should be used to represent a greater or lesser value. Typically mapping software gives several options. It is worth experimenting with these values to see which category of break-value is most suitable. If this is done incorrectly the break-value can mask potential patterns in the data. It is worth being particularily cautious of equal interval break-values unless the data is evenly distributed across the range it can misrepresent the data (Monmonier, 1996, p. 145). Some of the GIS software can construct histograms that show where the densities are on a chart, which is helpful for determining the best break-values. Another error encountered is the use of choropleth maps to show magnitude instead of intensity. Magnitude, for example the total number of artefacts collected, is best represented as graduated symbols or proportional points, when magnitude is show as a choropleth a bias toward smaller areas is created. However, choropleth used to show intensity, the total number of sherds per a particular area, can be effective (Monmonier, 1996, p. 22).

4. PRESENTATION

It is easy with all the different bells and whistles available with current GIS software to crowd a map with too much information and loads of colour. When the purpose of a map is understood it is possible to know what information is necessary. Confusion and clutter are not characteristics of information but of poor design (Tufte, 1990, p. 53). By narrowing the map elements to what is necessary, a barrier to the audience getting the clearest possible information is removed. Left with only the necessary information, the next step is to determine how to best organise it. This is where colour, texturing and labels when used effectively can be most useful.

Colour is a powerful tool for conveying information, in the right hands information is clearly presented and maps can be beautiful. Colour is a tool that needs to be used to guide the audience to the information that is the most important. When used ineffectively the audience is unable to know what information is the most important. In the wrong hands colour confuses the audience, who may even be so put off that they don't even examine a map. This is not to say that we all need to go out and take graphic design courses to learn how to best use colours but with a little thought and consideration, colour can be powerfully used.

Talking about how we use colour is important but first it's worth taking a step back and considering how we use colour when we only have two to choose, black and white. By learning how to best utilise black and white, mapmakers are getting to the very principles of good map communication. Working in black and white limits the amount of information that can be conveyed which is not necessarily a bad thing as it also focuses the message. Fortunately, the eye is accustomed to black and white, capable of differentiating between five and seven different shades of grey (Monmonier, 1996, p. 22). It is always worth considering how much can be done with just black and white as this can greatly simplify the mapmaking process, even if at times it means that more maps must be made.

Sometimes black and white is not preferable and colour is either desired or necessary. This is where moderation and planning is most helpful. If black and white have been fully utilised, the mapmaker has a grey canvas to put colour against. This background allows the colour to standout and the audience to quickly determine what information is most important. With the lower cost of publishing colour more and more publications can use it, whether they should or not. So it is worth mentioning a few of the issues that need to be considered when using colour.

Colour when used on a choropleth maps can allow the user to immediately identify the content of the map. When mapping

the density of artefacts, the content in this case, using a range of blue for example, on a neutral background leaves little room for confusion. The eye naturally sees darker colours as greater and lighter colours as lesser. Relying on this norm, as well as using only a range from one hue (Monmonier, 1996, p. 168) means that the audience will not need to refer back to the legend to discern which way the intensity is going when changes occur. Although one might be tempted to use a range of different colours, even to the extreme of the full spectrum of colours, a simple range within one colour is far less confusing (Monmonier, 1996, p. 22), even if this limits the number of break values that can be use. Colour is also impacted by the colours around it and the size of the area that contains the colour, this is worth remembering when considering labels too (Monmonier, 1996, p. 172-73).

Colour is not the only way of presenting information; labels and texture are all available as ways to show information and frequently can be more effective. Labels, while potentially requiring more time of the reader are the best if not the only way of informing the audience, particularly when showing a distribution of archaeological sites. Texture is the fall back for many people intending to publish in black and white. However, it is important to avoid using with a grey tone colour ranges with textures as they can influence the way that these tones are perceived (Monmonier, 1993, p. 72). It is important to ensure that dissimilar textures are used for dissimilar values and similar textures are used for similar values (Monmonier, 1993, p. 75).

Proportional point symbols, using smaller points to show lesser values and larger points to show greater values, can be effective even if the particular area is masked by the point. This can be particularly useful when several areas grouped together are showing increased amounts of artefacts in a small area. While the viewer may not be able to see the individual collection areas, they understand that overall this area had an increase in artefacts.

Map presentation goes beyond the confines of the map itself, to properly communicate with the audience it is important that the map relates appropriately with the text. A map must not only relate the text but the text needs also to justify and explain a point within the text. To simply show a map without explaining the role of the map, is as harmful to a map as poor presentation. While controlling the location of a map within the text can be difficult and costly, having maps near that text that discuss them, encourages the user to seek out the points in the map text that are being made on the map. Encouraging the audience towards this type of analysis will not only allow arguments to be reinforced by the visual tool of a map but encourage them to be more critical of maps and if the map is good, make them more effective users of maps. It is important to realise that some information is best explained as a map, a graph, (Monmonier, 1996, p. 58) and in the text. It is important that we take advantage of all the tools available to communicate effectively. While this is not a demonstration but a discussion and as such, it could exist with out images, the best way to discuss images is to show one.

As this is a black and white publication, the need to meet the demands of the medium limits the image for discussion to a black and white image (Figure 1). Figure 1 consists of 3 images 1.1, 1.2 and 1.3 that relate to the Troodos Archaeological and Environmental Survey Project (TAESP) Area in Cyprus. The purpose of the first two maps is to orientate the view to the area. Figure 1.1 is an overview map of Cyprus, showing the location of the survey area on the island, the area of focus for Figure 1.2. As only one set of images is being used for this particular discussion, it is important that it contains all the information that the user needs, in this case taking the viewer from the broadest view down to the more specific. Figure 1.2 shows greater detail, not only showing the different intensive survey zones of the project but also the topography and another rectangle for the area of greater detail in Figure 1.3. Repetitive as it may be to repeat much of the information in the caption of the maps; it is a necessary part of discussing the different elements of the map.

Figure 1.3, the largest and most information rich of the maps, has several elements that require discussion. Perhaps the best way to approach this is to start from the background and move forward. Underlying this map is a vertical aerial photograph of the area. Vertical aerial photographs, as well as more recently, high-definition satellite images, put the archaeology back in the landscape in ways that digital elevation models and digital terrain models fail. In this particular case they also provide a view of the Medieval Asinou Church as well as tracks and frequently breaks of slope. The aesthetic quality of aerial photographs should not be under estimated as well.

Placed against this aerial photograph background is a grey scale choropleth map. Set to natural breaks with all 5 different break values represented and a transparent diagonal lines used to distinguish the survey units absent of pottery for this chosen period, it is possible to see the different concentrations. In addition it is possible to see the spatial relationships between the individual survey units and the topography around it.

Labels, legend, north arrow and scale bar are all necessary elements of maps and add to the understanding. Careless mapmakers may leave one or all of these elements out of a map; this is usually not done intentionally. Frequently, however, mapmakers fail to ensure that these elements effectively stand out from the rest of the map. A light grey background was chosen for this map to clearly demarcate these elements from the rest of the map. Also a scale bar was preferred as it is wedded to this map regardless of any size alterations to the map in the future. As with many things, there is no right way to make a map but many wrong ways.

5. CONCLUSIONS

It has been the intention of this discussion to encourage mapmakers to be more critical and to commit more time and effort to the production of their maps. Through the construction of better maps, greater expectations can be made of the reader, not only of time but map reading skills. Maps made for an audience with greater map reading skills can be more complex and have higher expectations of the audience to spend more time analysing them.

Archaeologists should not be expected to tackle these issues in isolation. A conversation needs to occur, one that not only includes archaeologists but the broadest possible audience of cartographers, graphic and information designers. Map production is a powerful tool and maps can allow their author to communicate a tremendous amount of information efficiently, this should not be the privilege of the few. The importance of effectively communicating with images is no less important than with words and it is the responsibility of the mapmaker to ensure that the time spent by their audience interpreting their images is productive and useful. The expectation that maps will support arguments as clearly as they are made in text should be the rightful expectation of the audience. It is through this understanding that maps and mapmaking will grow to greater importance and there will be greater reliance on maps for interpretation and analysis for the entire archaeological process.

Mapmakers will only develop their skills through practice and critique; this is why the Archaeology Maps weblog was created. The Archaeology Maps weblog http://www.archaeologymaps.blogspot.com is a forum for presenting maps and critiquing others. Not only is the forum open to archaeologists but also to illustrators, graphic designers, information designers, cartographers and all others interested in discussing archaeological maps. It is hoped that this forum will allow many improve the maps they make and how they interpret the maps they see.

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FIGURES

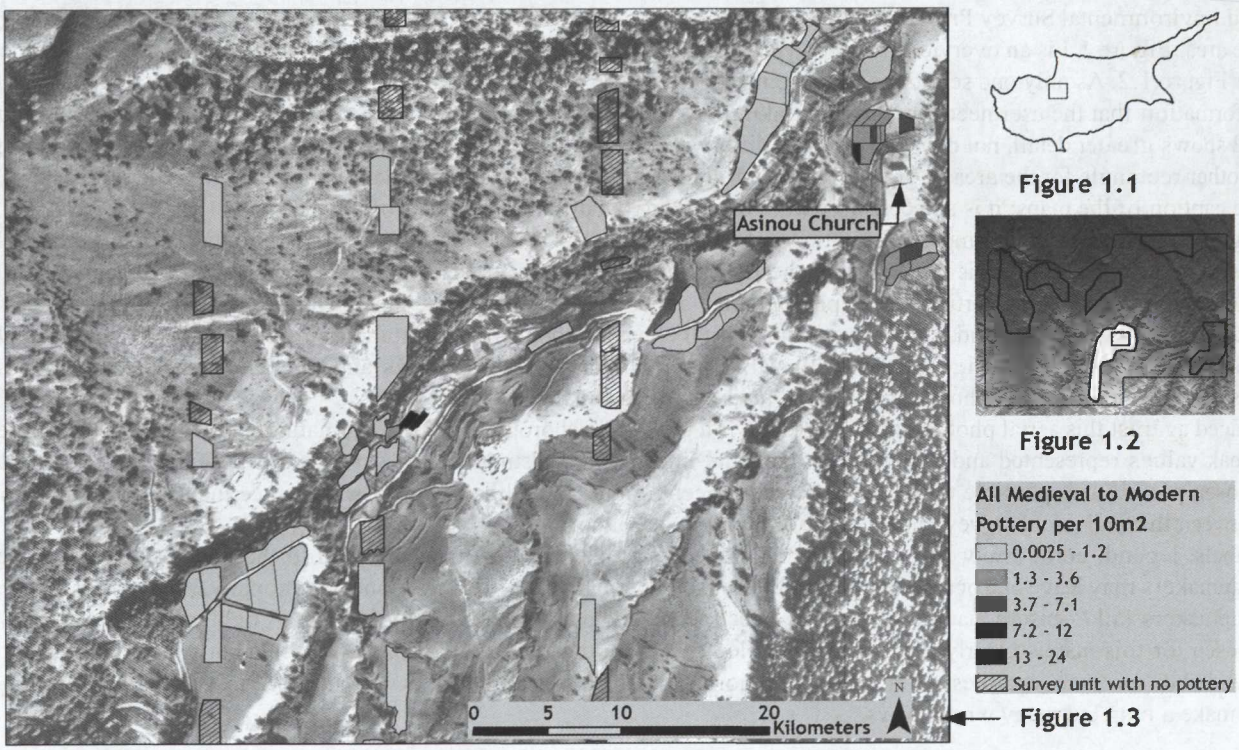

Fig. 1 – Troodos Environmental and Archaeological Survey Project (TAESP) Area.

Fig. 1.1 – Map of Cyprus with the TAESP survey area outlined in black.

Fig. 1.2 – Map of the TAESP survey area with the Asinou Intensive Survey Zone in white with the black rectangle around the Asinou Church Block and Transect Survey Area.

Fig. 1.3 – Detail map of the Asinou Church Block and Transect Survey showing the Medieval to Modern Pottery (AD 1191 – Present).