ANALYSIS OF SPACE AT THE WHITE MONASTERY: 
SHORT REPORT ON METHODS AND 
TECHNIQUES*

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Archaeological study of early monasteries in Egypt has concentrated on church-
es. There has also been work on some other types of buildings, such as refec-
tories. There has not been any effort to discuss spatial layouts as a whole, al-
though these can be informative even when buildings cannot be identified. At the 
White and Red Monasteries, much of the original area has now been developed, 
so a complete picture of the layout is probably impossible. Nonetheless, it is im-
portant to find out as much as possible before more evidence vanishes. We have 
utilized satellite imagery, which has suggested areas to investigate on site, and 
are hoping to use radar to complete a study of the easily accessible open areas 
as quickly as possible

This paper began as short report on work in progress, not designed for publication and 
now outdated by further work at the White Monastery. It is published to present two useful 
methods of analysis, addressing ways of looking at relationships between space and commu-
nity, suggesting how they may in future apply to the White Monastery. It is in part an appeal 
for tracking and analyzing complexes as a whole: all buildings and the spaces between them.

Philip Sellew and Sheila McNally have been interested in studying relationships both 
in and outside the monastery walls. This study involves looking for indications of various 
degrees of isolation and community: first, of individual privacy within the monastery walls; 
second, of solidarity in small communal units; third, of community throughout the monastery 
as a whole; fourth, of interaction with visitors; and, finally, of interaction with outside com-
munities. Literary evidence can provide much useful information. Material evidence can 
also contribute. Often documents say what happened, but not how. Material evidence may
help to shed light on the process.. Texts may also concentrate on what should happen, while material evidence shows how such ideals may work in practice. So far, little material evidence has been available, but that situation is changing. Contemporary investigation will make more and more material evidence available.

Architecture provides some of the most useful material evidence for communal life. Spatial analysis of buildings and building complexes can show us where people are likely to interact or to be isolated. Relationships between rooms in a building and between buildings in a complex can promote or inhibit communal life. To study relationships between the built environment and human interaction, the English architects and planners Bill Hillier and Julie Hanson have introduced an approach they call Space Syntax Analysis (Hillier and Hanson 1984). They have presented two basic methods. One, called Gamma or Access Analysis, looks at the interiors of buildings as interactive networks. The second, Alpha Analysis, looks at outdoor space in larger settlements. (Fig. 1 shows both Gamma Analysis, represented by lines running through all spaces, and Alpha Analysis, represented by contrasting exterior spaces as explained below.)

Both approaches, as first presented and as often applied, involve sophisticated statistical analysis, but they can also be used more simply to establish probabilities for further consideration. Mark Graham used a statistical application of Gamma Analysis to analyse “public and private” in a Roman house plan (1997). Roberta Gilchrist used a simple form to show gender differences in English monastic life (1994). Nicola Aravecchia (2001) also used a simple form of Gamma Analysis to show how life at the Kellia in later centuries could retain some of its original stress on solitude. His “justified access maps” of cells show how builders used layered plans that made some spaces hard to reach. In that way they could maintain a degree of individual privacy unusual in the ancient world even as they were crowding more and more inhabitants inside each cell and making more provision for visitors.

Ideally, to look at how spaces shape communal interaction we would use whole plans, but fortunately much can be done with partial ones. The amount of information so far available at the White Monastery is too small for any analysis. Still, it will be useful to keep some basic principles of analysis in mind as evidence appears. Too much monastic archaeology has concentrated on individual buildings, but even the most important ones, such as churches, derive part of their meaning from their contexts.

Most archaeological applications of Space Syntax Analysis have used Gamma analysis. In the present state of our knowledge, concepts from Alpha Analysis have more relevance for the White Monastery complex. This analysis, used in city planning, classifies the open spaces between buildings as axial (such as streets) or convex (such as city squares).
Convex spaces tend to give a shared identity to surrounding buildings and those who use them but also to isolate them from others. Axial spaces allow movement from place to place and so foster integration. Writing about urban planning, Hillier and Hanson suggest that settlements may function best when axial spaces flow through convex spaces so that there is interplay between insiders and outsiders, between group identity and group openness.

Some monasteries have such layouts, and others do not. Obviously, monks and nuns have different requirements from city dwellers as well common needs. There have been great variations in monastic life, including degrees of openness or enclosure. A simple application of Alpha analysis to several monasteries can suggest some of the possibilities. Figure 2 shows plans on which the major axial and convex spaces have been indicated: These monasteries represent three religious traditions: the Coptic Orthodox Monastery of el-Baramus in the Wadi Natrun, the Greek Orthodox Monastery of the Pantokrator on Mt. Athos, and the Benedictine Monastery of Cluny in Burgundy. The first two plans show the twentieth century state of still active monasteries that incorporate earlier constructions and the third plan is a proposed reconstruction of what existed in the twelfth century (Evelyn White 1933, Burridge 1976 and Conant 1968, respectively). Plans are, of course, not objective facts. They represent their makers’ interpretation of evidence. These appear as approximations that allow analysis leading to further investigation and interpretation.

At the Monastery of the Pantokrator, convex spaces are dominated by axial, unifying spaces that promote community among all the inhabitants and offer guests a considerable share in the life of the monks. Cluny, on the other hand, has numerous convex spaces with almost no connectives. Three cloisters give identity to their surroundings at the same time that they isolate different groups of monks from each other as well as from guests. The only area where convex and axial spaces combine to integrate partially is the area for guests at the bottom of the plan, well separated from the rest. Cluny was practically a convention center, playing host to multitudes of overnight guests and daytime church visitors, but never sharing its inner life. Today the monastery of el-Baramus appears closer to Cluny. It has separate convex spaces without axial connections except for those at the top, the area now easily accessible to visitors. Here, however, the separation has developed over time, as more and more buildings crowded within the original walls. In its beginnings, the monastery may have been much more open to visitors (McNally 2001).

We know Shenute’s White Monastery had several groups of monks and many visitors. So far, we have little indication of relationships, for instance, whether visitors usually crossed the paths of monks, or remained at a distance. A plan of the area would help us find out. What has appeared so far raises intriguing possibilities.

The plan of recent excavations near Shenute’s great church seems to show the White Monastery as very open (Mahmoud ali Mohamed and Grossmann. 1991). The buildings so
far uncovered do not cluster around convex spaces. As yet, long axial spaces that might serve large flows of people have also not appeared (or have not been mapped, see note 1). Instead, wide, short passages mean that people could easily pass from one place to another. Such permeability would increase the likelihood of frequent chance encounters, promoting a loose and open community rather than a more focussed and restricted one.

We might expect the church of the White Monastery to help create a major convex space, as the churches do at both the Pantokrator and Cluny. Certainly there is no possibility of such a space outside the west door, a fact that may indicate its lesser importance to the community. The possibility of a convex space outside of the northern or southern doors still exists. The southern side door may often have been the main entrance to an early Egyptian church.

Newer excavation has added buildings that can be seen in the satellite imagery (fig. 3). These structures are probably not all of one date. Building C (figs. 3 and 4) is probably contemporary with building A, Shenute’s church, and they might have formed borders for an intervening convex space. If that ever existed, building B destroyed it. B, C and D seem to be arranged so that they begin to shape two sides of an open space at the southwest of this scene, cutting it off to some extent from the area to the north, although wide passages exist. This is presumably the square mentioned in the excavation report, which also refers to a paved road going by the church. Neither feature emerges clearly on the published plan (Mahmoud ali Mohamed and Grossmann 1991).

Building C has been variously identified as a dormitory and a granary (Mahmoud ali Mohamed and Grossmann 1991; Grossmann 2001, 2004: 372). In 2002 Philip Sellew tentatively identified it with the “dispensary called the place of service” for the monks’ food that Bentley Layton has found mentioned in texts (Sellew 2002, Layton 2002, 33; 2003). One part of Building B seems to be a small dining area, possibly of the Fatamid period, when the monastery was still thriving and accumulating its library, and there are latrines in building D (Mahmoud ali Mohamed and Peter Grossmann 1991; Grossmann 2001).

It is interesting that these buildings seem to relate to each other around a possible open communal space that is separated from the church. By comparison, many Greek Orthodox Monasteries, like the Pantokrator on Mt. Athos, have such a communal space between the church and the refectory. The lack of a similar space at the White Monastery and the possibility of a space cut off from the church suggest a role for food in communal life somewhat different from the one the Greek Orthodox plan promotes. As yet, there is no way to tell whether this proposed convex space was easily accessible to lay visitors.

The space on the north side Buildings B and C is crossed by elaborate plumbing and other remains that await publication (marked E here). No convex space seems to exist there.
Excavations now under way will add more buildings, confirming or changing these impressions. It is to be hoped that they can provide us with a fairly complete plan for this core area.

As a supplement and a guide to excavation we also seek information by other means. Among those is examination by remote sensing technologies. Todd Brenningmeyer has examined the areas adjacent to the churches of both the White and the Red Monasteries using a variety of such technologies, including recently declassified satellite imagery from the first generation of U.S. photo-reconnaissance satellites code named Corona, multispectral images from the Landsat 7 satellite, and high resolution panchromatic and multispectral data from the QUICKBIRD satellite platform. These efforts have pinpointed numerous anomalies to be investigated on site or possibly excavated. I will mention two examples recently derived from the QUICKBIRD satellite platform. QUICKBIRD imagery is the most recent generation of high resolution commercial data products offering a resolution of 70 cm. in the panchromatic bands and a little over a meter in the near infrared. The opportunities for archaeological prospection have been greatly enhanced in recent years through the growing availability of satellite data with multi-spectral and radar capabilities. Unlike traditional aerial photography, which is limited to the narrow bands of the visible spectrum, multi-spectral imagery measures the reflectance of features outside the range of visible light. This characteristic allows a more thorough examination of areas of interest, where subsurface architectural remains cannot be easily identified by the human eye but can be measured by sampling the reflectance patterns of features across a range of bandwidths including both visible and infrared light.

While QUICKBIRD’s multi-spectral capabilities are not as enhanced as those of the Landsat system, the extremely high spatial resolution has proven to be extremely beneficial for identifying and interpreting structural and possible subsurface remains captured in the satellite scene. The dataset used in this study was acquired in the fall of 2002 and represents our most recent view of the site. This system has proven to be very valuable for this preliminary phase of study and the rest of this discussion will focus on the methods and results of our analysis of this dataset.

In the winter of 2002, work began on the initial processing and enhancement of the QUICKBIRD scene. Given the different benefits of examining the site using the panchromatic and multispectral bands, which offer high spatial resolution on the one hand and enhanced spectral resolution on the other, a decision was made to combine the two data types using current pan sharpening techniques. The resulting data preserved the 70 cm. resolution of the parent panchromatic scene but also offered the additional benefits of the infrared bands.

Figures 2 and 3 show the results of the pansharpened scene. The floor of the White Monastery church is clearly visible in the SE corner of the images and the various excavated areas of the monastery complex can similarly be identified both near the church and in the
area immediate to the west. The images also include two kinds of indications of areas for further investigation: one shows a feature visible above ground; the second notes differences in soil not visible to the naked eye. At the area marked Y on figure 3, two long parallel ridges and two cross ridges can be seen. In the winter of 2002-3, we looked at them on site. Such features noted in satellite imagery could also be found by walking over the terrain, but obviously the image allows a wider examination to direct the walker.

In the second case, marked X on figure 3, areas of interlacing lines stand out from the surrounding area, although they do not to the naked eye, and would not in an ordinary aerial photograph. (They are not visible in the small print published here.) There are a variety of ways in which subsurface deposits can be identified through aerial perspection. In addition to the variable response of vegetation over ruins, buried architecture can be identified through unusual qualities of the soil that overlies and surrounds it. Certain soil properties correlating with buried remains can affect the retention and dissipation of moisture. Such qualities similarly affect the spectral characteristics of soil in certain circumstances.

A number of spectral anomalies here can be identified as rectilinear patches in a contrasting color (light blue in one manipulation). These anomalies are not only set apart from the spectral character of the surrounding area but also include a number of straight lines running parallel to each other. The shape and spectral qualities of these features are suggestive and may indicate that some type of feature is preserved just below the surface of the site. Such regular shapes suggest human intervention: they frequently indicate the position of buried architectural remains.

Since this area has apparently been continually in the possession of the monastery, any construction seems likely to belong to that community, and especially to its early, most extensive phases. More than that cannot be said without at least surface cleaning. It may be significant that we again see two separate areas of activity with space around them, adding to the impression of openness and permeability rather than clustering. Differing soil conditions, however, might hinder the appearance of spectral traces, so we certainly should not assume that areas without any distinguishing features do not hide building remains.

Future research will involve a) more analysis of these scenes, looking at areas farther removed from the standing monastic buildings, b) more surface inspection of anomalies--the ones noted here are only the most striking and easily accessible for further study, since they are on the land now owned by the monastery--and, c) more non-invasive work, namely magnetic mapping to be carried out by Tomasz Herbich.3 What has emerged so far has raised interesting possibilities about communal relationships at the White Monastery, both under Shenute and during the later period of intense literary activity there. This paper presents a provisional analytic framework to be adapted as data accumulate.
Endnotes

*  Discussion here of the White Monastery has been outpaced by subsequent work there (see note 3). The report appears because of its methodological content. All endnotes were added in 2010, after the decision to publish.

1.  In 2004, Grossman provided a detailed analysis of the functions located in excavated areas. Unfortunately, the accompanying plan records only the stone buildings, distorting the interactions available to the users of the spaces. (Of course, spatial analysis does not tell us how people did move from place to place, encountering others or separated from them, but it does tell us what was and was not possible.)

2.  The present excavators apparently now consider this a granary, but that may still be questionable. Publication of recent work needs to occur before more discussion is appropriate: Hillier and Hanson argued for their mode of analysis in part because it allowed scholars to consider spatial implications of plans without defining functions, determinations that can often be often difficult or unreliable.

3.  This survey work has occurred, not yet published:

4.  We have used subsurface mapping to discuss with our Egyptian and monastic colleagues how to best protect the monuments still present at the site. The results of the magnetometry were less successful than anticipated, due to the large quantity of metal debris on site (e.g. soda bottle tops...). Accordingly, we switched to Ground Penetrating Radar at both the White and Red Monasteries, which yielded very interesting results, including the outlines of buildings below the current ground surface, and will inform our decisions about future areas of excavation.

Bibliography


------ 2003. “Monastic Order in Shenoute’s White Monastery Federation,” Paper delivered at Living For Eternity: Monasticism in Egypt, a Symposium at the University of Minnesota, March, Minneapolis, Minn.


List of Illustrations

1. Gamma and Alpha analysis of Cluny (McNally).
2. Simple Gamma analysis of three monastic plans (McNally)
Fig. 1. Space Syntax Analysis.
Gamma analysis (access map) represented by the thin blue lines through buildings and adjacent spaces.
Alpha analysis: external spaces characterized by red circles or ovals (convex) or by red lines (axial).
Fig. 2. Spatial Analysis (Alpha Analysis)  
Differing scales; north at the top.  

Upper left, Deir el-Baramus, 20th Century  

Upper right, Monastery of the Pantokrator,  
20th Century  

Lower right, Cluny, 12th Century.
Fig. 4. White Monastery, detail of satellite image, 2002. Detail of area near church (A), hypothetical analysis. Possible configuration: open area partially bounded by buildings B, C and D.