Athens Journal of Architecture

Quarterly Academic Periodical,
Volume 10, Issue 1, January 2024
URL: https://www.athensjournals.gr/aja
Email: journals@atiner.gr
e-ISSN: 2407-9472 DOI: 10.30958/aja

Front Pages

Athens Journal of Architecture

Published by the Athens Institute for Education and Research (ATINER)

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The Athens Journal of Architecture
ISSN NUMBER: 2407-9472- DOI: 10.30958/aja
Volume 10, Issue 1, January 2024
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Editorial and Reviewers' Board

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The current issue is the first of the tenth volume of the *Athens Journal of Architecture* (AJA), **published by the Architecture Unit of ATINER**

Gregory T. Papanikos
President
ATINER

Athens Institute for Education and Research

A World Association of Academics and Researchers

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8-11 July 2024, Athens, Greece

The Architecture Unit of ATINER, will hold its **14th Annual International Conference on Architecture, 8-11 July 2024, Athens, Greece** sponsored by the Athens Journal of Architecture. The aim of the conference is to bring together academics and researchers from all areas of Architecture. You may participate as stream organizer, presenter of one paper, chair a session or observer. Please submit a proposal using the form available (https://www.atiner.gr/2024/FORM-ARC.doc).

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- Submission of Paper: **10 June 2024**

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Athens Journal of Architecture - Volume 10, Issue 1, January 2024 – Pages 9-34
(received: 30 November 2022, received in revised form: 11 July 2023, accepted: 19 September 2023)

Faith in the Stars and Architecture: Astrology as an Interpretation of Religious Permanence and the Birth of Modernity

By Raffaella Maddaluno[*]

In 1912, Aby Warburg presented his interpretation of the frescoes at the Palazzo Schifanoia in Ferrara at the 10th International Congress of Art History in Rome. The decision to expound his theory in an academic setting was no coincidence: Warburg's work, and the subsequent studies of Fritz Saxl, sought to centre the attention of art history on the complex world of astrological studies. The history of astrology demonstrated—via iconological analysis—the migration of knowledge from East to West. Warburg's innovation was to superimpose the trauma of historical-artistic paths on this network. Through the Schifanoia frescoes, he could reflect upon how an international comparison with the surviving figurative concepts of Eastern Mediterranean civilisations had generated the stylistic transformation of the human figure in Italian art. Warburg defined astrology as ancient religion's most tenacious form of hidden survival. He traced a path of continuity through art and its relationship to the architectural space hosting it. Astrological illustrations not only enable us to reconstruct the warp and weft of religious permanence but serve as a tool to explain the procedures of iconographic change that led to the Renaissance. After the collapse of paganism, many astrological images survived into the Middle Ages as symbols associated with the essences appropriated by Christianity as its own. A complex store of astrological iconography that migrated from classical cultures and reappeared during the Renaissance's construction of a universal language. Some foretastes emerge in medieval buildings; after a long period in which Christianity and astrology were considered incompatible, astrological language completed and provided meaning to the architecture that welcomed it. Such is the case of the Palazzo della Ragione in Padua. This paper aims to retrace the most significant paths of this migration of symbols through the analysis of such examples of Renaissance architecture as Villa Farnesina in Rome and the aforementioned Palazzo Schifanoia. It will also reflect on the position and training of the architect during the Renaissance and on how astrology was considered both magical thought and a mathematical description that would lead to the discovery of infinity. It is notable that the Farnesina's astrological contents were dictated by Baldassarre Peruzzi, the building's architect.[1]

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1. This work is financed by national funds through FCT - Fundação para a Ciência e a Tecnologia, I.P., under the Strategic Project with the references UIDB/04008/2020 and UIDP/ 04008/2020.

A Question of Methodology

The vast majority of reflections on astrological culture and its relationship to art derive from the studies—of indisputable interest even today—of art historians Aby Warburg (1886–1929) and Fritz Saxl (1890–1948). In the final decades of the 19th century, studies of the history of astrology aroused great interest. They crafted a broad panorama of the topic of migration of knowledge, relying on objective tools such as philological evidence which permitted the drafting of guidelines and control elements for those interested in studying the stars. Ever since his study of Rembrandt and the artist's missed relationship with Italy, Saxl had focused his methodology on the centrality of stylistic facts. Yet he proposed a different path to their study. He studied stylistic change in a field immense in both geographical and chronological terms. Astrology represented, for him, a training ground for the enactment of the instrument of comparison.[2] Changes in representation sparred with thematic consistency. The mechanisms by which astrological images were selected, disseminated, and transformed had operated across a vast expanse of time, from antiquity to the Renaissance and beyond. It was almost impossible to draw stable boundaries between geographical areas for such processes. Yet astrological iconography had scarcely been studied. As Salvatore Settis points out, the timing and methods of knowledge transfer could, in part, be pieced together from the texts of science historians. Scholars of images thus faced an interesting task: the study of astrological iconography, that is, the appearance of constellations and planets over the centuries and in different geographical areas, and how the images populating the sky have transformed in comparison to those created by classical art. Astrology easily lent itself to this "style inquiry". One could adopt a method that maintained maximum consistency in theme and meaning, addressing such important and central themes of art history as the survival of antiquity and exchanges in the dynamics of influence between Italian and Nordic art.[3]

The cultural encounter between Saxl and Warburg is based on a common methodological vision: the opening of the world of art history to disciplines never explored before. Settis efficiently summarises their operation as appropriating problems and instruments developed outside of art history, then approaching the universe of images, capturing the models and engines of artistic development, verifying their mechanisms through adherence to historical evidence, and using specific philological procedures.[4]

The history of astrology that gradually emerged, thanks to Warburg and Saxl, allowed for the analysis and redrawing of the migration of knowledge and texts from East to West and vice-versa. It was possible to trace relationships of a genealogical nature among the various images of constellations and planets and

2. On Saxl and his studies on images and astrological iconography, see his important essay on "Saturno e la malinconia" (Turin, 1983), written with Raymond Klibansky and Erwin Panofsky, and *La storia delle immagini* (Rome and Bari, 1965, 2ª ed 1982).

3. S. Settis, "Introduzione," in *Faith in the stars. From Antiquity to the Renaissance* (ed.) F. Saxl. (Torino: Bollati Boringhieri, 2016), 13.

4. Ibid, 21.

create iconographic patterns from them. In his studies of the Schifanoia Palace frescoes, Warburg himself posited, "to what extent can the advent of the stylistic transformation of the human figure in Italian art be regarded as resulting from an international confrontation with the surviving figurative concepts of the pagan civilisations of the Eastern Mediterranean?"[5]

The grand contribution of these two authors to the world of art history, and to that of knowledge transfer, in general, was to employ astrological illustrations as a special path to the study of the transformation of style. Both helped enrich the landscape of the historical conditions in which the Renaissance bloomed, although (as Gombrich has noted) Saxl attributed a larger role in the transmission of the classical heritage to the Middle Ages.[6]

When we analyse Saxl's path relative to form language as a special instrument for art history, we find that—despite distancing himself from the methodology—he always returned to it and compared it to other instruments. Carlo Ginzburg has noted this lack of distancing from form, raising a fundamental issue in the use of figurative evidence as a historical source: it provides a large quantity of first-hand information that can be interpreted without mediating with the mentality of an age.[7] He argues that approaching a historical problem with the tools offered by art history, as Saxl does—transitioning from a purely formalistic reading to consideration of the individual work of art as something complex that reacts to the historical events encompassing it—is only effective when the iconographic model is employed as one's main tool. Efforts to focus one's historical reading on style facts instead risk running aground. He further observes that to lend concreteness and historical truth to conclusions drawn from stylistic analysis, Saxl resorted to parallel, textual documentation (captions, handwritten notes).[8]

Ginzburg appears to suggest that iconographic inquiry and the analysis of style seem to somehow diverge, as text, rather than images, found and provide truth to historical interpretation. This thought effectively emphasises the risks of a historicised reading of style as reflecting artistic development, and in general, the historical situation. As Settis argues, iconographic data—unlike stylised facts—are the product of unambiguous mediation between a given cultural, political, and religious environment and the work of art.[9]

If images are to be used as a historical source, it is crucial to associate the work of art with other historical documents of the same period. Rather than a relationship of equivalence between artistic objects and historical context, this implies mutual support and integration, Settis argues.[10] Saxl's stance on the study of astrological iconographic sources is to not consider the history of form as completely autonomous, with the chronology of artwork springing from the works themselves. Rather, the aspiration of art history to be a historical science must be

5. A. Warburg, *Arte e astrologia nel palazzo Schifanoia di Ferrara* (Abscondida, 2006), 268.

6. E. Gombrich, "Introduzione," in *A Heritage of Images* (ed.) Fritz Saxl. (Penguin, 1970), 11.

7. C. Ginzsburg, "Da A. Warburg e E. H. Gombrich: note sul problema di metodo," *Studi medievali. Terza serie* (1966): 1016.

8. Ibid, 1037.

9. Settis, "Introduzione," 2016, 35.

10. Ibid, 36.

supported, on the one hand, by the sequence of events, and on the other, by the power of documentation.[11]

Naming the Skies

To orient ourselves amidst the complexity of the migration of knowledge, a sequential line should somehow be drawn so that we can understand the process that led a large share of Eastern culture to influence Western culture in iconographic terms during the Middle Ages and up to the Renaissance.

The synthetic framework that served as a map for Saxl was drawn, in part, by Boll, who argued that the cradle of astrology and astronomy (the two were indistinguishable, initially) was Babylon, with possible intrusions by the Sumerians and Egyptians.[12]

Several phases in this process can be distinguished, without however necessarily constituting a timeline. The first was the observation of the skies, which led to the identification of stars and groups of stars. This recognition led to the tendency to catalogue, group, and describe.

The second phase was the naming of stars and constellations. At some point, the names began to be drawn from the gods and heroes of mythology. A true process of mythologising the skies was thus activated. Finally, the last stage—perhaps the most interesting for our treatise—is the doctrine of the influence of the stars over earthly events. As Settis states, once the stars and constellations received mythological names, all the properties and characteristics of the Greek gods and myths about them were transmitted to the star and lent themselves to the task of interpreting every constellation in which that planet figured[13] The influence of the star and the influence of that god became the same thing: as if the Name had taken on a power of its own.[14]

According to Boll, the first stage of observing and describing the sky is an element of classical Greek culture, derived in part from Babylon and Egypt. The mythologisation of the sky corresponds to the end of the sixth century. The doctrine of influence that forms the basis of astrology corresponds to Greece's Hellenic period.

Astronomical knowledge, on the other hand, was assimilated early on by the Greeks: Thales of Miletus and the astronomical notions possessed by the Ionian Greeks come to mind. Astronomical studies allowed for careful observation of the sky, which contributed to the understanding of cycles and the movement of the stars.[15]

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11. F. Saxl, "Le ragioni della storia dell'arte," in *La storia delle immagini* (ed.) F. Saxl (2005).

12 F. Boll, Bezold, and C. W. Gundel, *Storia dell'astrologia* (Bari: Laterza, 1987).

13 Settis, "Introduzione," 2016, 23.

14 Boll, Bezold, and Gundel, *Storia dell'astrologia*, 1987.

15. With the *Phaenomena* of Eudoxus of Cnidus, written arout 370-360 BC, the Greeks had a complete description of the celestial sphere, with the position of the stars and constellations and the recognition of every single star that made up the constellations. Eudoxus' model was not immobile, but an armillary sphere with rings. Each ring corresponded to the rotation of the sky. The model was

His complex and rich series of contributions will not be explored here. Nonetheless, he dominated the Greek view of astronomy up to the time of Ptolemy and the publication of the latter's masterful work, known by the Arabic title *Almagest.* The following centuries evinced only commentary on the fundamental *Syntaxis*.[16]

Astrology instead owes its development not to astronomers but to a poet, Aratus of Soli. His 275 BC poem *Phenomena* explored the sphere of Eudoxus. With the appearance of this astrology-focused narrative, the science of astronomy was definitively spliced. As Repellini points out, through works like that of Aratus Hellenistic citizens developed a view of contemporary astronomy as divided into an uncontroversial half, within reach because based on observable phenomena; and another, more esoteric half, founded on nonphenomenal entities.[17]

This method of popularising astronomical knowledge represented, on the one hand, a strong demand for astronomical knowledge; yet on the other, a definite divorce of mathematical and specialised astronomy from the public.

Aratus' publication was immensely successful, despite numerous astronomical inaccuracies openly criticised by Hipparchus. His extraordinary popularity in ancient times was certainly not due to engaging writing. Literary critics viewed the poem as rather arduous and boring. It was probably due to the subject matter, which was not discussed using specialist language but was readily available through the mnemonic power of verse. His skies were also "mythologised", the constellations named for Cassiopeia, Perseus, and Andromeda, for ease and recognisability. For the easiest way to recognise constellations is to view them as drawings composed of imaginary lines.[18] A simple drawing of stars is associated with such a powerful preexisting iconographic system as to influence and determine how stars are drawn.

In the 8th century, Ptolemy's texts were rediscovered in Byzantium and commented on until the fall of the empire.[19] In Byzantine culture, they encountered the already-consolidated interest of Arab astrologers in the themes of star reading and naming. Up to that point, Arabic astrology had been based on Greek works in translation. The doctrine of planetary conjunctions took shape with the Arabs. The translated Greek texts also spread to Persia and India.[20]

Astrology found its place in Western Europe when it returned through the Arabs, especially in the courts of Spain and Sicily. Frederick II's well-known astrologer, Michele Scroto, will be discussed later on. Although Christianity attempted to deny mythological astrology due to its link with paganism, it was later forced to open up to mythological knowledge. Thanks to the Arabs, the latter

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both geometrical and kinematic. Eudoxus enriched his model with homocentric sphere theory, which served to explain the motion of planets.

16. Settis, "Introduzione," 2016, 24.

17. F. F. Repellini, "Cielo e Terra," in *Il sapere degli antichi* (ed.) M. Vegetti, 126-162 (Torino: Bollati Boringhieri, 1985).

18. Settis, "Introduzione," 2016, 24-25.

19. Boll, Bezold, and Gundel, *Storia dell'astrologia,* 1987, 45.

20. Justinian's closure of the Athens school (529) drove many Greek scholars to emigrate to the court of Khosrow (531-579). The texts were translated first into Middle Persian, then Arabic, and thus returned to Greece and the West.

entailed a set of astronomical scientific notions that were difficult to refute, especially with the empirical cultural instruments at the Church's disposal. Settis writes: "The *philosophorum deliramenta* were meant to be rejected to the extent that they presumed to replace the Christian God or man's free will. But if the natural laws governing the motion of planets and stars and their influence on the sublunary sphere could be drawn from the observation and description of the skies, weren't these laws no less manifestations of God's will?"[21]

Arabic mediation, therefore, represented not merely a vehicle of transfer, but a form of legitimacy.[22]

We Are Children of the Stars

There is an illustration in a 15th-century Greek manuscript—the Greek Parisian 2419—which we know to be copied from an earlier Syriac manuscript. The illustration depicts the figure of a man enclosed in a circle and surrounded by zodiac signs. The signs are divided into male signs on one side and female on the other. Each emits a ray directed towards the corresponding limb of the body (See Figure 1).

The Medieval and Renaissance illustrations which depict man as the mirror of the universe are rooted in late antiquity. Although the evidence is not indisputable, careful analysis of the man at the centre of the image reveals a club and fabric draped on his arm. This suggests a correspondence with depictions of Hercules, for example, who is almost always shown with a club and lion skin. Like the Persian Mithra, he was venerated as a cosmic divinity.[23]

If we go back to cosmological myths of Iranian origin—as Saxl explains in detail—we find the narrative of the creation of the first man, "Mortal Life, which was created in the likeness of the universe: he shone like the Sun, his width was equal to his height, the sky was his skin, the Earth his flesh, the mountains his bones, the rivers his veins. The seawater was his blood, the ocean his stomach, the plants his hair, and minerals were his bone marrow. This idea of the microcosm is also found in ancient India and other cultures, and transmigrated into late antiquity. We know that in Hellenistic times, the myth of the first man was translated into astrological language, assuming that the body of mortal man was made in the likeness of the first man: the signs of the zodiac formed his trunk and limbs, the fixed stars his teeth, the heavenly wind his nose, the seven planets the seven openings of his head. This step allows us to make a leap. That is, what was initially only a metaphor became definitively associated with the human condition and destiny.[24]

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21. Settis, "Introduzione," 2016, 29.

22. For a better understanding of the dynamics of transmigration of astrological knowledge, see the frameworks proposed by Gundel and Gundel at the end of their *Astrolumena*, Wiesbaden, 1985, p. 383.

23. Saxl, "Macrocosm and Microcosm in Mediaeval Pictures," *Lectures* (1957): 58-72.

24. Saxl, *La Fede negli astri. Dall'antichitá al Rinascimento* (ed.) S. Settis (Torino: Bollati Boringhieri, 2016), 47.

Figure 1. *Hercules as Ruler of the World and the Correspondence between his Limbs and the Zodiac Signs [Caption from KBW], ms. gr. 2419, XV cent., fol. 1r, Paris, Bibliothèque Nazionale*
Source: http://www.engramma.it/eOS/index.php?id_articolo=2133.

There is yet another leap to be made: the association of this iconographic model with Catholic faith and culture. Without delving too far into a complex list of examples demonstrating the Church's absorption of late antique cosmological and astrological culture, one image is sufficient: the microcosm contained in the Lucca manuscript of Hildegard's *Liber divinorum operum*. In this illustration, man is at the centre of the celestial spheres. His arms are open and his head and feet touch the innermost circle. The human figure's height corresponds to its width, even as the height of the firmament coincides with its width. The winds surround the man, and the rays of the seven planets touch his head and feet. God appears on high, embracing the universe of which the man-microcosm is the centre.[25]

25. Ibid, 52.

Figure 2. *Hildegarda di Bingen, Liber Divinorum Operum, Beginning XIII cent., Lucca, Biblioteca Governativa, ms.1942, fol. 9*
Source: http://www.engramma.it/eOS/index.php?id_articolo=2133.

In reality, Hildegard's use of these cosmological images did not reflect the dynamism of ancient doctrines. For her, they were simple symbols representing the universe's influences on man. They were useful illustrations to teach ethics and Christian doctrine by which she framed her life.[26]

Such use of the symbols was fairly common throughout the 12th century, save in Spain, where the Arabic influence assigned another type of use and value to these images (See Figure 2).

Arabic and Jewish translators were active in Spain and Southern Italy, spreading the cosmological theories of late antiquity but above all—and this was their novelty—the practices associated with them. The dynamic and divinatory character of Hellenistic cosmology determined its use. Pagan doctrines, on the one hand, and doctrines drawn from the biblical account of creation, on the other, developed and coexisted during the late Middle Ages.[27]

Aby Warburg discovered a 14th-century manuscript that illustrated concepts quite similar to those exhibited in Hildegard's book. He argued that the manuscript probably derived from a copy produced during the time of King Alfonso the Wise,

26. For more on Hildegard's book, see the following bibliography: M. Cristiani, and M. Pereira, *Il libro delle opere divine di Ildegarda di Bingen* (trans.) M. Pereira (Milano: Arnaldo Mondadori, 2003).

27. M. Centanni, and M. Bergamo, "Dal cosmo all'uomo e ritorno. Lettura di Tavola B del Mnemosyne Atlas di Aby Warburg," *Engramma. La tradizione classica nella memoria occidentale* settembre/ottobre (2016).

a recognised expert in astrology.[28] Its pages depict scenes of human life, organised in circles, and a system of sectors influenced by the cosmos.[29]

The final stage of this complex and rich journey takes us to the beginning of the emergence of what we know as modern thought.

In one depiction of the microcosm from the beginning of the 15th century, the figure of an atypical man appears: imprisoned in a web, as Saxl describes it, of motion determined by the stars. If we compare this image with the figurations of man often found during the Renaissance, we discover how new and revolutionary the conception of man in modern times is: no longer a passive victim of cosmic forces, he struggles. As Pico of Mirandola argued, man is the most elect of creatures. Nothing on earth equals his mind and soul, and he can rise above the heavens (Della Mirandola 1946, 416).[30]

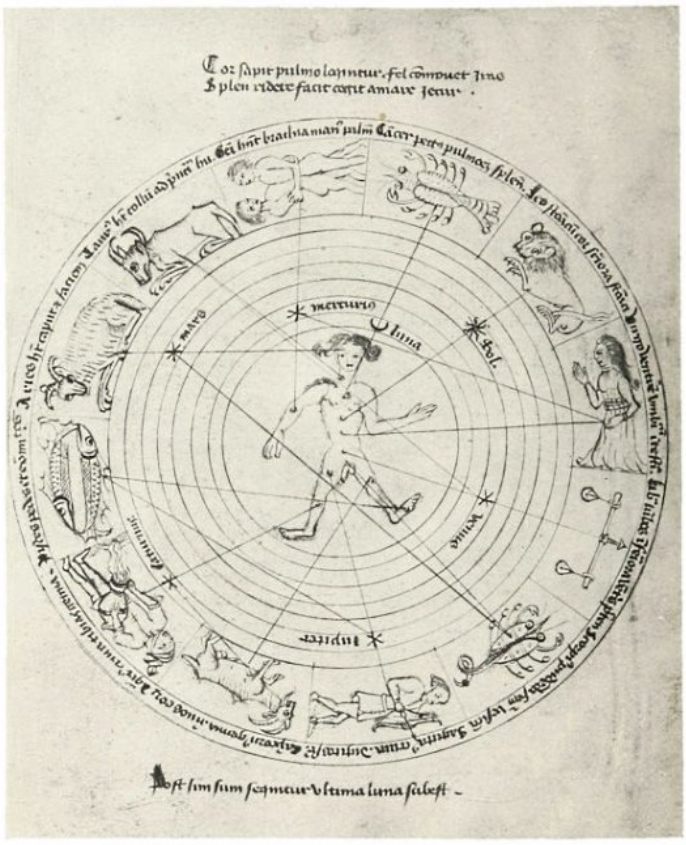

Figure 3. *Microcosm. Paris, Bibliothèque Nationale, ms lat. 11229, fol. 45r (XV cent.)*
Source: https://www.gutenberg.org/files/46572/46572-h/46572-h.htm.

28. Warburg, *Divinazione antica pagana in testi e immagini dell'etá di Lutero* (SE, 2016), 343.

29. Miniature from a 14th-century Spanish manuscript of the *Picatrix*, the Moon straddling a hare. The 28 sectors identify the 28 stations of the moon. In each station, the professions astrologically connected to it [caption from KBW], 'paranatellonta' (stars that rise together) of the moon, Rome, Vatican Library, Cod. Vat. Reg. lat. 1283, fol. 23v.

30. P. Della Mirandola, "Disputationes adversus astrologiam divinatricem III," in *Opera* (ed.) Eugenio Garin (Firenze, 1946).

Interest in Predicting the Future: Permanence and Transformations

Scholars of the cultural dynamics of medieval and Renaissance civilisation are well aware that knowledge of astrology is indispensable for understanding both its iconography and the cultural practices of society. There was no difference between astronomy and astrology during these two eras. Knowledge welcomed astrology as an indispensable tool. The study of stars was not conducted as an abstract science, but with a practical purpose, namely the prediction of the future.[31]

As is easily intuited, astrology played an important role at the end of classical antiquity. Its importance was such that several Olympian gods were replaced by astral figures. For example, Saturn and Venus no longer appeared as gods of the Periclean age, but in the guise of demons. In its attempt to eradicate astrology, Christianity was forced to embark on a difficult battle, in some cases reaching hard-fought compromises. The figure of Christ eventually dethroned the planets. In the end—save for the days of the week, which in the early Middle Ages still retained their planetary names—astrology was definitively eradicated and disappeared.

We also owe the possibility of seeing the position of each star on celestial maps to Ptolemy's tables.

In addition to Ptolemy's astronomical work, an astrological treatise known as the *Tetrabiblos* gained ground. Although the 19th century's contempt for astrology caused it to be forgotten, scholar Franz Boll reassessed the work. Franz Boll's studies of Claudius Ptolemy paved the way for critical editions of the *Tetrabiblos* and the pseudepigraph *Karpòs*. Boll collected important pages in the *Spaera* and in the *Catalogus codicum astrologicorum graecorum*, published by Franz Cumont. A path opened that was the product of classical philology, the history of religion, and historical investigations that gathered momentum thanks to the availability of texts on ancient astrology and its implications for philosophical concepts, religious beliefs, and the daily life of man.[32]

The early Middle Ages drew knowledge from such late Latin writers as Pliny, Macrobius, and Isidore. Medieval translations made it possible to study the original Greek sources. This rediscovery provoked a change in how intellectuals approached the problem of God, nature, and morals.[33]

In 1910, almost on the eve of the Great War, a large number of periodicals devoted to astrology began to appear and many remarkable books were published. This awakening of interest in astrology, and in particular in its predictive facet, was rooted in an ancestral desire to feel oneself a part of the cosmos, on the one hand, and the need to control, predict, and prevent the dangers of chaos and war, on the other.

Pagan astrology gained ascendency in the 12th century in part for the same reason. In this era, disquiet over such events as the Crusades, for example, must have fed into deep dissatisfaction with the Christian religion, no longer able to

31. Saxl, *La Fede negli astri. Dall'antichitá al Rinascimento,* 2016, 163.

32. O. P. Faracovi, "Per la storia dell'astrologia," *Bruniane & Campanelliana n.1* (Accademia Editoriale) 6 (2000): 227-229.

33. Saxl, *La Fede negli astri. Dall'antichitá al Rinascimento,* 2016, 163.

completely satisfy the spiritual needs of man. A breach opened for the revival of paganism.

Two channels enabled the rebirth of astrology in the 12th century: diffusion through English academics travelling to Spain and a reawakening in Southern Italy. [34] Yet the interest of the English was limited to nonfigurative domains. They created an imaginative and speculative form of astrology rather than images of the planetary divinities.[35] In Southern Italy, by contrast, the astrological revival resulted in the rediscovery of pictorial depictions of the ancient gods and their myths. The planetary divinities of the era bore little resemblance to their classical counterparts: tradition had been interrupted, and the images of the gods were reinvented based on textual descriptions.[36]

To better understand this passage, consider the depictions of Saturn sitting and then falling, illustrating the planet's rising and setting. The most interesting feature is how the planet's representation is modelled after human life and nature because the demon could thus influence the fate of ordinary mortals. Saturn is a man who oversees time and the wheel of fortune's rising or sinking into the abyss, depending on the vagaries of fate.

The wide reach and familiarity of these beings contributed to their survival in Christian culture. Various aspects of society were associated with figures of pagan derivation. The person responsible for this adaptation was Michael Scot, who lived from the end of the 1100s to around 1236. He was Scottish and came to the court of the Swabian Emperor Frederick II as an astrologer. His popularity at court was undisputed because he was able to invent new types adapted to everyday life. As Saxl describes, Mars and Venus are the warrior and the beautiful maiden, Saturn appears as a half farmer, half warrior, Jupiter is a high judge, and Mercury is portrayed as a bishop (see Figures 4-5).[37]

34. For those who study the history of cosmological phenomena, England is a special field, as the evolution of thought there has been less conditioned by outside influences.

35. Saxl reports an episode that explains the attitude of the English towards the astrology of Southern Italy and Spain. In 1158 and 1159, Abrāhām ibn 'Ezrā, one of the most renowned Spanish astrologists, visited London and announced that a global catastrophe would strike in the year 1186. Spanish and Italian astrologists had predicted the catastrophe long before, based on the rare conjunction of many planets in a single sign. At the time, London enjoyed much stronger ties to Toledo compared to today, so it is no wonder that such a prediction provoked a wave of terror. The bishop of Canterbury himself ordered a three-day fast to invoke the grace of God and mitigate the catastrophe predicted by Italian and Spanish astrologers for the year 1186 (Saxl 2016, 180).

36. Ibid, 165.

37. Mercury represents culture because in late antiquity, Hermes was called Trismegistus. He was believed to be the author of a collection of mystical religious writings. Hermes was also identified with Thoth, the Egyptian god of wisdom. It was precisely this half-barbarian, half-Greek god-- not the Roman version-- who was revived. So it was that bishops and ecclesiastics were placed under his jurisdiction (Saxl 2016, 165).

Figure 4. *Saturn, Jupiter, Venus, Mercury, Michael Scot, Ordo Stellarum fixarum, Vienna, National Bibliothek, ms lat. 2352, fol. 27 r (Saturn)m 27 v (Jupiter), 28 v (Venus and Mercury) (ca. 1392-93)*

Figure 5. *Saturn, Jupiter, Venus, Mars, Michael Scot, Introductorium magnum. Munich, Bayerische Staatsbibliotheck, Clm 10268, fol 85 r (ca. 1340)*

Figure 6. *The planets Jupiter, Mars, Venus, and Mercury. Michael Scot, De XLVIII imaginibus zodiaci, Vienna, National – Bibliothek, ms lat. 3394, fol. 235 r (Jupiter and Mars), 235 v (Venus and Mercury). (ca. 1480)*
Source: (Saxl 2016, fig. 42)

As Saxl points out, it is not difficult to recognise, in these entirely new figurative schemes, the Babylonian astral divinities: Nergal (Ninib), the fearsome god of war; Marduk, the judge and lord of fates; Ištar, the goddess of joy; Nabū, the god of scribes.

This Babylonian derivation clarifies the iconography of some medieval depictions. For example, the figure of the Sun on the bell tower of Florence's cathedral, represented as a king holding a sceptre in his left hand and the solar disk in his right. This image corresponds to the Babylonian Šamaš, known as the king of the gods. The process of "Christianisation" of ancient figures also appears more comprehensible. In Padua's Great Hall, for example, the sun is depicted with the imperial crown; in the Chapel of the Eremitani in the same city, he appears in the guise of the pope, king of the Church. Mercury, who in Viennese 3394 appears as a man holding a book (see Figure 6), becomes a bishop with a book in the Munich Latin manuscript (see Figure 4). Even Jupiter (descended from Prince Marduk), for example, undergoes a substantial transformation in Viennese 2352 and in the Munich Latin manuscripts 10268. Mercury is Nabū the scribe, the erudite, who becomes a bishop. As "scribe", Nabū is depicted in Florence's Spanish Chapel; as a teacher on Giotto's bell tower and in the frescoes of the Eremitani choir in Padua; as a learned man before his book on the column capital of the planets at the Doge's Palace in Venice; and next to his lectern, on which a globe stands, in the Great Hall of Padua (Nabū was the patron of astronomy).[38]

As we continue to draft a very hypothetical reconstruction of the geographical influences on astrological iconography, we find that in the Hellenistic age—from the time of Alexander—Greek culture and religion become widespread in the East.

38. Ibid, 140-141.

Eastern beliefs also arrived in the West, melding with Greek ones. Astronomy, or stargazing, was not of great interest to Greek thought, as the Babylonians and Egyptians had already undertaken the study of celestial and natural phenomena for centuries, with great results. This lack of interest meant that for a short time, astronomy could advance in the absence of religious implications. After Alexander the Great, Eastern culture permeated the Greek world, forcing Hellenistic scientists to review their reflections. Figures referencing the stars, with other names and figures, appeared alongside such mythological names and figures as Hercules, Perseus, and Andromeda. This is one reason why a second, "barbarian" sphere, the so-called *Sphaera Barbarica*, appeared next to the Greek one at some point in late antiquity. It associated names taken from Babylonian and Egyptian astronomical culture with the constellations.[39]

In the face of this multitude of names—a mixture of Greek, Babylonian, and Egyptian references—astronomers imposed order, dividing the celestial sphere into 360 sections, one for each day of the year. The stars included in a section came to govern the specific corresponding day. This mechanism of astrological attribution distanced the simple observation of the sky. Interest in the astronomical hieroglyphics of destiny appeared in its place.[40]

The *Sphaera Barbarica* was translated into Latin for the first time in Southern Italy when Michael Scot was at the court of Frederick II. It was, however, translated not from Greek but from an Arabic version of the text, written at the beginning of the Arabic domination. Its diffusion and success were proven by the large number of illuminated manuscripts drawn from this model. Each page of the *Sphaera* was generally divided into three rows of figures: at the top, the constellations of a section of the sky as passed down in Indian doctrine; at the middle, those of the Persians; at the bottom, the Greek ones.[41]

Abū Ma' šar (d.886) made the first attempt to wed the Persian and Indian spheres with the Greco-Roman one. But no illustrated manuscripts of his text exist. The illustrations of *Sphaera Barbarica* date back to the rebirth of astrology during the Middle Ages. The most important is the British Museum's Sloane 3983.[42]

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39. As Boll notes, in late antiquity Greek astronomy was enriched with constellations known to barbarian peoples, with no connection to the classical sphere. Depictions of an Egyptian *sphaera*, containing both Greek and Egyptian constellations, date back to the Hellenistic era. But there is no evidence of the existence of both Eastern and Western manuscripts containing illustrations of Teucer's work, the most important one in this field. It is, however, very likely that other illustrated manuscripts about this sphere once existed. See, on this subject, F. Boll, *Sphaera*, University of Michigan Library (January 1, 1903).

40. Warburg, *Arte e astrologia nel palazzo Schifanoia di Ferrara*, 2006, 253.

41. As Saxl points out, in truth this division was not so sharp, as all three rows were based on the Greek system and most divinities and constellations were of Greek origin. Medieval scholars took them at face value, unable to imagine what modern scholars would hypothesise and demonstrate: that the medieval West received from India-- through the Arabs-- its own patrimony of astrological beliefs which, having emigrated to the East for some time, returned with an Eastern veneer, clearly adorned with several elements embraced during the eastern voyage (Saxl 2016, 168).

42. The Western depictions of these constellations can be divided into three types: the Vatican Library's Latin Reginense 1283, in which the three spheres are concentric with the Indian one outermost, the Babylonian one in the middle, and the Ptolemaic innermost; the Latin Munich 826

The text was made accessible through several Latin translations. It became so influential that Alfonso the Wise and King Wenceslaus of Bohemia enriched it with illustrations in the 12th century. At the end of the 1400s, Duke Borso d'Este (1413–1471) had the court calendar illustrated according to the Indian decans of Abū Ma' šar.[43]

A careful analysis of Sloane 3983 reveals that the illustrator contemporised the figures in keeping with the customs of the era, and these figurations became canonical. Directed at a narrow and very learned audience with an interest in reconstructing the Greek-Eastern patrimony, this manuscript of the *Sphaera Barbarica* never became popular. The illustrations recall Michael Scot, but it is important to understand that the illustrations of Abū Ma šar are not based on Eastern models. His constellations and planets have a Western character (see Figure 7). There is, however, one aspect that leads Saxl to argue that some of the depictions of specific planets are Eastern in origin.[44] It would otherwise be impossible to explain why, in the 1400s, we find Mars represented with a severed head, Venus with a lute, or Jupiter and the Sun seated on the ground in an oriental fashion. The same zodiac signs appear to derive from an Arabic model, that of Andaló di Negro,[45] an astronomer who transferred to the court of King Robert of Anjou at Naples.[46]

Figure 7. *Albumazar, Treatise on Astrology, Sloane MS 3983, c. 1350-75*
Source: https://www.bl.uk/collection-items/instruments-including-a-harp-viola-lute-and-hurdy-gurdy-from-albumazars-treatise-on-astrology.

If we return to Spain, with a manuscript that in all likelihood originated in the circle of King Alfonso X of Castile, known as "the Wise", we find a diagram in which the figure of a scorpion (or bull) appears in the centre, surrounded by a

from the fund of King Wenceslaus, wherein each 10-year period is depicted in a small panel; and the final one, which the London manuscript belongs to.

43. Warburg, *Arte e astrologia nel palazzo Schifanoia di Ferrara*, 2006, 265.
44. Saxl, *La Fede negli astri. Dall'antichitá al Rinascimento*, 2016, 171.
45. H. Hauvette, *Boccacce* (Parigi, 1914).
46. T. Lynn, *A History of Magic and Experimental Science* (New York, 1934), 191.

series of 30 different images – animals, men, and women. Each zodiac sign encloses a 30-degree portion of the ecliptic, corresponding in turn to a one-month interval. The entire zodiac chart covers an arc of 360 degrees and comprises 12 signs. As each degree represents one day in the sun's path, astrologists had to associate each degree with a star in order to predict—from each day's constellation—the nature of those born on that day. They created a purely fantastical sphere (see Figure 8).

This is the reason why only a few figures seem familiar to us. Astrology lost touch with astronomical observation.[47]

Figure 8. *The Signs of Cancer and Taurus, Surrounded by the 30 Daily "Faces", Libro de Astromagia. Biblioteca Vaticana, ms Regin. Lat. 1283 (XIV Cent., First Half)*

Source: https://www.cervantesvirtual.com/obra-visor/imagenes-magicas-la-obra-astromagica-de-alfonso-x-y-su-fortuna-en-la-europa-bajomedieval/html/e12ecb23-b8d4-46c0-a2a0-ca9a692b991a_18.html.

An Astrological Cycle of the Late Middle Ages: The Palazzo Della Ragione in Padua

Figure 9. *Great Hall of the Palazzo della Ragione, Padua*

47. Saxl, *La Fede negli astri. Dall'antichitá al Rinascimento,* 2016, 165.

Of interest to the narrative construction of this text is the existence of miniatures, conceived for a 14th-century (or at the earliest, 13th-century) manuscript, that lie outside the illustrated manuscripts of the late antique era. The illustrations of the *Decem continens tractatus astronomie,* by Guido Bonatti (13th century),[48] represent scenes of everyday life in Italy at the time: a sick person in bed, a marriage contract, a sick person before the city gates. There is no apparent relationship to astrology, nor do they represent constellations and planets. What they do represent, for the first time, is a sort of textbook containing the answers that the cosmos can provide to everyday problems (see Figure 9).

The most elaborate cycle of astrological depictions known to us, in Padua's Palazzo della Ragione, also dates to the 14th century. It consists of more than 300 figures that unequivocally present iconographic concordances with several figures in Bonatti's manuscript. The figures of the frescoes are divided into three bands. The contents of the second and third rows have been extensively studied and explained.[49] They depict, in order, apostles, zodiac signs, and images of the respective months, planets, and children of the planets (see Figure 10).

What remained to be interpreted were the figures of the upper row. Burges[50] tried to explain the links between the depictions of the Salon and the images contained in a singular book of astrology, the *Astrolabium planum*, attributed to Pietro d'Abano (1250-1315).[51] Yet neither Burges nor Barzon systematically examined the correspondence between the upper-row figures and those of Peter of Abano: a failure that Saxl tried to remedy in his publication.[52]

48. Bonatti was an Italian mathematician, astronomer, and the most celebrated astrologer of the 13th century. He served as advisor to Frederick II, Holy Roman Emperor, Ezzelino da Romano III, Guido Novello da Polenta, and Guido I da Montefeltro. He was a 13-century scientist and physician at the court of Frederick II.

49. See also A. Barzon, *I cieli e la loro influenza negli affreschi del Salone in Padova* (Padua 1924), which contains reproductions of all the hall's frescoes. Among the older books dedicated to the hall is the collective publication *Il Palazzo della Ragione di Padova* (Venice, 1964) with texts by L.Grossato, *La decorazione pittorica del Salone* (pp. 45-67), and N. Ivanoff, *Il problema iconologico degli affreschi* (pp. 69-84).

50. W. Burges, "La Ragione de Padoue," *Annales archéologiques* (1858): 331-343.

51. Pietro d'Abano was an Italian philosopher, physician, and astrologer. He was a professor of medicine, philosophy and astrology at the University of Paris and, from 1306, at the University of Padua; moreover, he is considered the first proponent of Padua's Aristotelianism.

52. Saxl, *La Fede negli astri. Dall'antichitá al Rinascimento,* 2016, 281.

Figure 10. *Great Hall of Reason in Padua, Side Wall*

Figure 11. *ANGELUS (JOHANNES), Astrolabium Planum in Tabulis Ascedens, [Venice, Luc' Antonio Giunta, 1 December 1502]*
Source: https://collections.nlm.nih.gov/bookviewer?PID=nlm:nlmuid-9410622-bk.

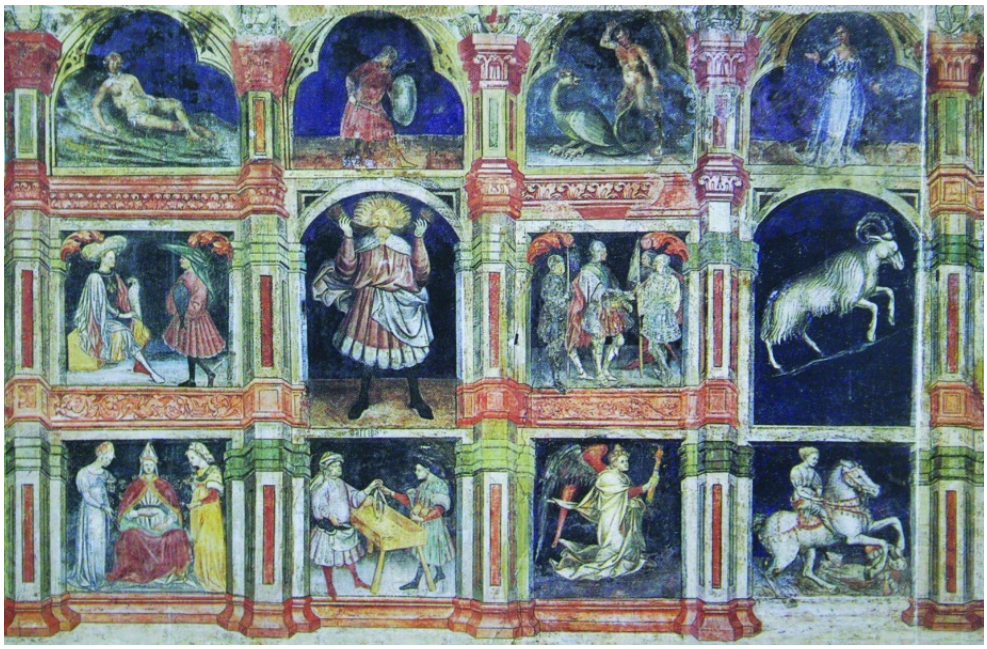

Figure 12. *Great Hall of Padua, Wall Painting. In the Upper Band: Fantastic Constellations, among them Aries, the Corresponding Month of Mars (Playing the Double Horn) and the Sons of the Planet of Aries, Mars (14th Century) [KBW Caption], Frescoes*

Franz Boll discussed the historical genesis of the *Astrolabium* in his *Sphaera*. Warburg ascertained that the manuscript model for the *Astrolabium* was Reginense code 1283 (see Figures 11-12).[53]

The Palazzo Schifanoia in Ferrara

In the midst of the revival of interest in the ancients in the 15th century, astrology did not lose its link with the deformation of classical iconological culture deriving from the Arabs. There was, instead, a true growth in interest. Subjects portrayed only in manuscript illustrations or small paintings in the 13th and 14th centuries began to be reproduced in large-scale frescoes during the Renaissance. Perhaps the most relevant example is the Palazzo Schifanoia in Ferrara, where we find all the elements of the *Spaera Barbarica* already mentioned in this text. The figures depicted are Eastern in origin, as can be seen clearly in the depiction of the sign of Aries. A dark-skinned man in strange dress, a woman with an exposed leg, and a man holding an arrow with a ring appear. These images reference Eastern, not classical, culture. Thus we find a certain continuity between late medieval astrology and that of the early Renaissance.[54]

Yet if we examine some details (for example, the figure of a man who is very poor in appearance, in both his clothes and his wrinkled face; and kissing lovers, drawn from the scene of the kingdom of Venus), we have the impression of facing

53. Warburg, *Divinazione antica pagana in testi e immagini dell'etá di Lutero*, 2016, 343.
54. Saxl, *La Fede negli astri. Dall'antichitá al Rinascimento*, 2016, 170.

substantial changes, although both are based on the achievements of astrology during the 13th and 14th centuries. The difference is that in the 13th century, astrology was a novelty newly arrived from the East, which had not yet had the time to lose all the exotic and fantastic trappings of its journey; it became fully integrated by the 15th century. As Saxl points out, the distance which had separated astrological paganism from medieval Christianity in the 13th and 14th centuries and enabled the return to exotic sacrifices and prayers no longer existed when humanism began to permeate European civilisation through the rediscovery of the classics.[55]

This phenomenon of cultural metabolism can be seen in the palace at Ferrara, where the realism of the paintings transforms even the strangest Eastern demons into courtiers with a distinctly Ferrarese appearance. This leads us to conclude that astrology was considered part of daily life in 15th-century Italy. These images, updated to reflect14th - and 15th-century customs, do not, in their totality, reproduce the celestial vault; on the contrary, they line the walls in bands, much more similar to the composition of a manuscript page. As Warburg has shown, they portray Indian and Persian constellations that the West gained awareness of through a 9th-century author, Abū Ma´ ša, and the Hebrew and Latin translations of his work. They are images of demonic beings, derived from the Egyptians, who divided each zodiac sign into three decades of 10 degrees each. Each sign is governed by three faces known as decans.

The fresco series at Ferrara's Palazzo Schifanoia in Ferrara originally depicted the twelve months. Each month is divided in three parallel bands stacked atop each other, the figures about half life-size. The Olympian gods, riding triumphal chariots, appear in the top band. The bottom one is dedicated to daily activity at the court of Duke Borso d'Este (1413-1471). The central part portrays the astral divinities and is divided into three segments. Each zodiac sign is depicted in the centre, flanked by enigmatic figures that we recognise as complex and fantastical Eastern symbols who lost their original Greek appearance in crossing over to Asia Minor, Egypt, Mesopotamia, Arabia, and Spain.[56]

Multiple artists worked on the fresco, and we are indebted to Fritz Harck and Adolfo Venturi for carrying out a complex stylistic analysis of the entire cycle. To Venturi we also owe the discovery of the only documentary evidence, a letter dated 25 March 1470 which states that Francesco del Cossa created the first three months (March, April, May) (see Figures 13-14).

In the March fresco, Pallas is portrayed bearing the Gorgon on her chest and a spear in her hand. She is borne along by a triumphal chariot pulled by unicorns. To her left, a group of Athenian scholars is pictured, including doctors, jurists, and poets: likely a representation of real-life Ferraresi of the time. To the right of the chariot, a group of women are intent on sewing and weaving; according to

55. Ibid, 171.

56. Warburg, *Astrologica. Saggi e appunti 1908-1929*, 2019, 31.

astrology, those born under the sign of Aries are gifted with special skill in handling wool.[57]

Figure 13. *Interpretation Scheme of the Schifanoia Palace Frescoes (Handwriting Elaboration by the Author)*

Figure 14. *Schifanoia Palace in Ferrara and Palace of Ragione in Padova: A Comparison (Handwriting Elaboration by the Author)*

57. Warburg, *Astrologica. Saggi e appunti 1908-1929,* 2019, 44.This analysis, in itself quite interesting, applies to each month the fresco is divided into. For an exhaustive treatment, see Warburg and Saxl's analysis on the entire cycle.

Agostino Chigi and Astrology

The iconographic apparatus we have seen in the palaces of Padua and Ferrara appeared on the walls of religious buildings with some delay. An example is the Church of San Francesco in Rimini, commissioned by Sigismondo Malatesta, also known as the Temple precisely because of the astrological symbols adorning its interior. Its pagan character was heavily criticised.

Pagan lords of heaven began to appear on church domes at the beginning of the 15th century. These images of constellations were inspired by those depicted in Greek baths and Qusair 'Amra. One example is the cupola of the Old Sacristy of San Lorenzo, the burial site of Cosimo de' Medici, or the dome of the Pazzi Chapel in Florence, where images of the stars may be glimpsed. They reproduce the exact image of the sky as it would have appeared to a Florentine observer at a certain time of day.

Examples of celestial buildings prior to the Farnesina have been known since antiquity, as it was natural to consider the house of the divinised monarch as an image of the universe. Even medieval fantasy was permeated, in both East and West, by this conception. The ceilings of countless churches and chapels are adorned with gold stars on a blue background. But there were no apparent attempts in the Christian Middle Ages to decorate, in the spirit of ancient or Islamic astrology, the ceiling of a sacred place with images of the zodiac and other constellations. The medieval cathedral's starry sky is anonymous, with no place for pagan heroes: Perseus and Hercules, Draco and the Corona Borealis, Aquila, Gemini and Pisces. The Church banished the constellations even from civic palaces.[58]

Similarly, the Farnesina vault is characterised by a close relationship between a celestial configuration, correctly observed and depicted from an astronomical point of view, and the life of the individual. In the middle, Fame proclaims the star-decreed glory of a man who can be none other than the founder himself, Agostino Chigi.[59]

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58. Saxl, "Macrocosm and Microcosm in Mediaeval Pictures," 1957, 308.

59. The Via della Lungara chosen by Chigi was situated at the foot of the Janiculum Hill, on the opposite side of the bend of the Tiber, outside the walls yet still inside the Leonine City and adjacent to the Trastevere district. Known for its bucolic qualities but above all, its proximity to the Vatican and the nucleus of the historical centre on the opposite riverbank, it was characterised by vineyards and religious institutions in the 15th century.

Pope Julius II amended the route of the Lungara in the 16th century, inserting it-- together with another strategic road on the other side of the river, the Via Giulia-- into his ambitious urban plans. Several individuals of extremely high social status chose to build their homes on the Lungara, attracted by the beauty of the landscape and abundant space. These conditions permitted the construction of villas with different architectural characteristics compared to those in Rome's historical centre. M. Caperna, *La lungara. 1. Storia e vicende edilizie dell'area tra il Gianicolo e il Tevere* (Roma: Edizioni Quasar, 2013).

In 1505, Agostino Chigi acquired land with vineyards to build his main residence, relegating Via dei Banchi-- where his rented home was located-- to a minor role. This choice, though apparently lacking any specific meaning, in reality speaks to Chigi's far-sighted vision in moving his place of business. No longer the chaotic, noisy, crowded, promiscuous scene of the Ponte Rione, but a bucolic, fortified site, where it was possible to exercise power not only over practical

As Fritz Saxl explains in detail in his book, the Farnesina images have nothing in common with the strange figurations of the Paduan and Ferrara cycles. The entire program is governed by a series of zodiac signs. The first, Aries, appears to face those arriving in the hall from the Loggia of Psyche. The other signs continue leftward, in the customary sequence, through Pisces. Amidst the zodiac signs, corbels feature the constellations of fixed stars situated in the sky in the immediate vicinity of the corresponding sign: that is, Eridanus next to Aries, Auriga next to Gemini, Argo Navis next to Cancer, etc. That this fundamental pattern was not recognised up to now, despite its simplicity, is in some measure due to the artist himself, who intentionally hid it beneath the mythological veil of the decoration.[60]

Likewise, in designing the ceiling decoration scheme the artist even avoided symbolising the cosmic regularity of the stars. Indeed, he did not assign an equal place to every zodiac sign or planet, favouring the representation of mythological (Jupiter and Europa, Leda and the swan, Erigone seeking her father) rather than astronomical elements. Thus we even find the two signs that follow Virgo in the zodiac, Libra and Scorpio, crammed into a single compartment adjacent to that of Diana. Nor is their myth narrated in this space. Only their symbolic figures appear on the blue background, with two conversing Olympians in between. From the left, Mercury descends in flight towards Mars, who offers his sword in a gesture of friendship. This representation signifies that the planet Mars is in Libra. Nearby, Mercury is in Scorpio.[61]

In summary, the astral configuration represented is the following: Jupiter in Aries, the Moon in Virgo, Mars in Libra, Mercury in Scorpio, the Sun in Sagittarius, Venus in Capricorn, and Saturn in Pisces. One wonders—a question halfway on the path between astronomy and astrology—when is such a configuration evident in the sky? Dr Arthur Beer of Hamburg identified the date as 1 December 1466.[62] Now we know that Chigi must have been born around 1465. There is reason, then, to doubt Hermanin's presumption that the ceiling of the Farnesina depicts the birth of its founder[63] (see Figure 16).

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functions, but in more subtle and elaborate ways. Agostino Chigi created a true court around this villa, as if he were a pontiff or a monarch.

The villa's design was entrusted to a young architect, also from Siena, Baldassarre Peruzzi (1481-1536). The structure adopted the same layout of a loggia with jutting wings that we find in Innocent XVIII's Villa Belvedere, and especially the Villa Volte Alte in Siena, perhaps designed by Francesco di Giorgio (1439-1502) for Agostino Chigi's father, Mariano, and completed by Peruzzi for his brother Sigismondo. This explains the choice of Peruzzi as the architect of the Villa Farnesina. R. Samperi, "La cittá delle vigne, dei giardini e delle ville," in *Roma. Le trasformazioni urbane nel Cinquecento. II Dalla cittá al territorio* (ed.) G. Simoncini (2011), 117-118.

60. Saxl, *La Fede negli astri. Dall'antichitá al Rinascimento,* 2016, 307.

61. Ibid, 311.

62. G. Cugnoni, *Agostino Chigi il Magnifico* (Roma: Forzahi Soc. Romana di Storia Patria, 1878).

63. Thanks to Pope Alexander VII, we have an early biography of Agostino Chigi, later published by Giuseppe Cugnoni, that cites his presumed date of birth (MCDLXV). Subsequently, a document was discovered in the Siena State Archives demonstrating that the date of birth hypothesised by Saxl was a mere two days off. The document states: "Agostino Andrea di Mariano Chigi was baptised on 30 November 1466 and was born on the 29th of this month at the hour of

We glimpse something distinct here from the frescoes at Padua and Ferrara, which offer the representation of a general cosmological system. In contrast, the ceiling of the Farnesina is like the Florentine cupolas: the realistic image of an astral configuration connected to a significant event. But it is no less characteristic for the way in which "gravity" and realism of the cosmic image are veiled in decoration. The relationship of dependence, filiation almost, between men and the stars is not represented by the style of the Paduan frescoes. In contrast to their depiction in the 15th-century manuscripts, these gods are not akin to common men (here Saturn is god of the fields rather than a simple farmer, as the men of the 15th century perceived him). They resemble men in their subjection to the passions of love and hate, like the gods of Ovid. Yet they are also—like those divinities—infinitely far removed from the daily lives of men.

Figure 16. *Villa Farnesina Chighi: Astrological Diagram of the Ceiling (Handwriting Elaboration by the Author)*

In summary: in Padua and Ferrara, the frescoes seem almost enlarged pages of a manuscript, with a realistic style of representation. In the Farnesina, the ceiling glorifies more than it represents. The astrological content is portrayed discreetly; a classical, Ovidian feeling dominates the environment. These astral divinities are beings who bear nothing in common with the Christian God and saints. They are Homer's superhuman figures.

9.30". Rowland notes that it was unusual for baptismal directories to report time of birth. This directly links him to the common pursuit of astrology, as time of birth is only needed to calculate the ascendant. I. D. Rowland, "The Birth Date of Agostino Chigi: Documentary Proof," *Journal of the Warburg and Courtauld Institute* 47 (1984).

There is one thing to consider, however: nothing in the Farnesina ceiling alludes to the Christian spiritual world. Yet another monument, which owes its existence to the same patron, teaches us that we would make a mistake if we imagined this Renaissance man to be a pure "pagan." The dome of Agostino Chigi's funeral chapel in Santa Maria del Popolo in Rome also depicts constellations. Yet the ceiling mosaic does not represent a specific configuration of the sky, although planets also appear there in combination with the zodiac signs. An angel appears above each one, and in the centre, God the Father dominates all. This dome is the counterpart to the Farnesina ceiling. Evidently, it means that although the course of the world is determined by the planets and their position, these are not free: compelled as they are to obey the will of God. This conception of man's relationship with the cosmos is quite different from the pagan one. It reconciles the astronomical world of pagans with the empire of the triune God. For Agostino Chigi and his painter Baldassarre Peruzzi, the planets were beings tied to fate, intermediate figures between demons and Homeric demigods. Yet they remained tools of the hand of God.

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Athens Journal of Architecture - Volume 10, Issue 1, January 2024 – Pages 35-54
(received: 19 July 2023, received in revised form: 28 November 2023, accepted: 29 December 2023)

Architecture as Infrastructure for Archaeology: A Design Strategy for Crapolla's Abbey in the Sorrento Peninsula Landscape

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The contribution aims at investigating the relationship between invisible archaeology, coastal landscapes and architectural design through the case of St. Peter's Abbey archaeological site, in the Fjord of Crapolla, Massa Lubrense, in the Sorrento Peninsula, that has been the subject of an interdisciplinary research held at the University of Naples Federico II. In these particular situations, architectural design works on an interpretative condition where the intersection between reciprocal learnings takes on great importance in order to define articulated design strategies for the valorization of the weaker ancient traces still present in the contemporary territory. The Crapolla's Abbey is an emblematic case, where the achieved results by different studies, from archaeological excavations to surveys, from studies on ancient materials and construction techniques to those on the spolia architecture, from landscape studies to geological ones, inevitably become the basis of architectural design, which has to be constantly updated, taking the connotations of an "open work" and becoming a sort of "building site of knowledge" in progress, where the new architecture becomes an "infrastructure" for archaeology.

Introduction

In the crossing of archaeology, landscape and architecture, places where archaeological findings are barely perceptible or completely invisible take on a particular characterization. A clear example is embodied by archaeological sites, located in isolated coastal landscapes and totally dipped into nature, which have not yet been excavated, or which have been excavated, covered and forgotten. Here, archaeological remains are so hardly distinguishable to express a silent and unintelligible condition into the landscape.

It is a very wide and problematic issue which requires very specific design answers. In these cases, the architectural design, developed before and during archaeological excavations, has necessarily to take an interdisciplinary approach, since it refers to something that is not visible or even to something forgotten, which gradually re-emerges. The project has to deal with an interpretative and evocative condition, which tries to explain weaker traces and where mutual intersections between archaeological excavation, knowledge of the site and open project, but also between nature and artifice, memory and amnesia, imagery

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and imagination represent some of the main tools that characterize design approaches in these specific situations.

This interesting topic has been faced and developed in an interdisciplinary research experience,[1] led on the case of the archaeological site of the St. Peter's Abbey in the area of the Crapolla's Fjord, municipality of Massa Lubrense, in the Metropolitan city of Naples, located along the extreme offshoot of the Sorrento Peninsula that extends towards Capri (Figure 1).

The research work has investigated the relationship between coastal landscapes, invisible archaeology and architectural project, through a transdisciplinary interpretation that has crossed different studies and knowledge. From this interaction, design strategies and hypotheses have been developed, aimed at the conservation and at the enhancement of the site, intended as a unitary cultural heritage in the contemporary territory, but also aimed at the prevention, with the involvement of the local community, of the loss of the ancient traces still present here.

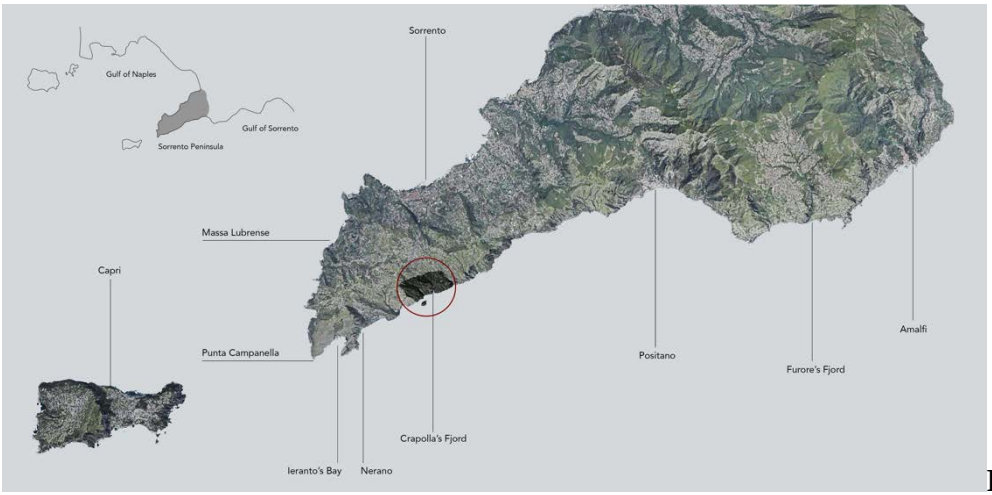

Figure 1. *Crapolla's Fjord in the Sorrento Peninsula: Aerial View, 2017*
Source: Drawing by Francesca Coppolino, 2017.

1. The research experience, here described, was conducted into the framework of the Applied Research Convention stipulated between the Department of Architecture DiARC of the University of Naples Federico II and the Municipality of Massa Lubrense (NA), set in July 2016, also in reference to the Agreement (2016-2019) between the Department itself, the Municipality and the Superintendence of Archaeology, Fine Arts and Landscape of the Metropolitan area of Naples. General research coordination: Valentina Russo; Research group for architectural design aspects: Pasquale Miano (group coordinator), Francesca Coppolino, Angela Spinelli.

Invisible Archaeology between Amnesia and Imagery

With the expression "invisible archaeology"[2] it is intended to focus the attention on archaeological remains that are so absorbed by nature that they blend in with the surrounding landscape, becoming "one thing" with it. In this case, the limits between artifice and nature are difficult to perceive and the topics of memory and amnesia, of imagery and imagination become important tools for the architectural project.

The case of the St. Peter's Abbey in Crapolla is an emblematic case on the topic of invisible archaeology in coastal landscapes, since it is an archaeological site, totally incorporated into the fjord landscape, which was mostly unknown before the systematic interdisciplinary research work led from 2008 by the Department of Architecture of Naples DiARC of the University of Naples Federico II.[3] The religious complex has been the subject of many archaeological excavations, led during the long period of research, but also of historical, geological, landscape and design studies, which have helped to make some parts of the ancient mysterious fabric gradually understandable, even if, for other lost parts, the possibilities of interpretation are still open and wide.[4]

Only at a superficial look St. Peter's Abbey in Crapolla shows itself as a ruin similar to many others spread throughout the territory of European and Italian cities. Here, more than in other cases, the specific condition of a difficult site to reach predominates, since it is located in the intersection of impervious paths that cross and go up the Fjord (Figure 2). It is a set of routes on a territorial scale that, on the one hand, connects the site to the sea, in several directions, on the other, connects it to the hill and to the near widespread cores of the town. A set of routes that finds, in the area of the ancient complex, a natural viewpoint, with fascinating views of the coast so disruptive as to prompt to forget the architecture that is present there.

2. By "invisible archaeology" it is meant the archaeological sites not yet subjected to excavations, or the sites excavated as a result of "inevitable" territorial transformations, studied, documented and then re-buried to guarantee their conservation. In: Lucina Caravaggi and Cinzia Morelli, *Landscapes of invisible archaeology. The case of the Portuense district* (Macerata: Quodlibet, 2014), 22.

3. The involvement of the Department of Architecture DiARC in relation to the Crapolla site, can be traced back to 2008, the year from which many issues related to the knowledge of intangible values, physical-constructive characteristics of the various artifacts and the landscape were investigated (coordination: V. Russo). For a deep analysis of the results of the activities carried out between 2008 and 2013, see: Valentina Russo (Ed.), *Landscape as Architecture. Identity and conservation of Crapolla cultural site* (Firenze: Nardini, 2014).

4. Field work, regarding archaeological excavation campaigns, has been coordinated by the archaeologist Giovanna Greco, Department of Humanities DSU, University of Naples "Federico II", both during the research activities conducted between 2008 and 2013 and for those done between 2016 and 2019. For a depth analysis of the excavation investigations and the interpretative hypotheses on the configuration and stratification of the religious complex, see: Giovanna Greco, "Peoples in the Sorrentine Peninsula, between myth and reality," in *Landscape as Architecture. Identity and conservation of Crapolla cultural site* (ed.) Valentina Russo (Firenze: Nardini editore, 2014), 211-221.

Figure 2. *St. Peter's Abbey in Crapolla's Fjord: View at a Large Scale, 2017*
Source: Photo by Marco Facchini, edited by Francesca Coppolino, 2017.

Ruins, which can be hardly traced, have a very close relationship with the natural landscape of the Crapolla's Fjord in which they are inserted: from the sea it is possible only to see a few remains, then reaching the top of the hill, from the small beach, it is possible to find a hidden place, located on the edge of the slope and totally open to the sea. In the current situation, here, although they are difficult to distinguish, there are the apse, the sacristy, the atrium, the wardrobe (*armarium*), the crypt, various stairs of the ancient St. Peter's Abbey that led to the paths towards the slope and, finally, it is possible to discover the Roman cisterns[5] (Figure 3).

Today, the examined site appears as a set of limited fragile ruins, assimilated by nature, which recall what George Simmel wrote about the relationship between ruin and nature: "the ruin of a building shows that, in the disappearance and destruction of the work of art, other forces and other shapes have grown, those of nature, and thus, from what still lives in ruin of art and of nature, a new whole has

5. In the Fjord to a first Roman occupation between the 1st century BC and the 1st century AD, the complex of cisterns connected to a water system that insists on the narrow strip of beach belongs. It was only in the early Middle Ages that the Abbey dedicated to St. Peter was built on the western side of the Fjord. In the Viceregal age, the tower of St. Peter was built on the eastern side of the inlet; finally, the so-called "monazeni", on the eastern side of the beach, used as a resting place for fishermen and for sheltering boats, complete the picture of the architectural presence within the Fjord. Cfr: Greco, "Peoples in the Sorrentine Peninsula, between myth and realit," 2014, 211-221.

come out".[6] The peculiarity of the ruin, described by Simmel as a new element that comes from the combination of artifice and nature, is precisely what it is possible to find in the Crapolla's Fjord, where the identification of the artificial element is, in some cases, very complicated, almost impossible.

Figure 3. *St. Peter's Abbey in Crapolla's Fjord: The Archaeological Remains, 2017*
Source: Photo by Marco Facchini, edited by Francesca Coppolino, 2017.

In the case of the Abbey, nature has re-appropriated the building till the point that its remains are difficult to distinguish, since they now make an inseparable unity with it, shaping an overlapping of perceptions, temporalities and different images.

This particular condition could lead to believe that the balance reached between nature and artifice should not be changed, that there is nothing else to do to than preserve what remains today and appears to our observation. However, Simmel's own consideration on the continuous and never-ending changing of the condition of ruin, transformed over time into something "new", highlights how conservation itself is an active and complicated process, a process which presumes the change.[7]

The case of the ruins of the Abbey is a clear example of this condition, since the need for conservation has stimulated multiple issues in different directions and has promoted the identification, in addition to the topic of the relationship between nature and artifice, of other two design topics, that are extremely sensitive and helpful in the context of the contemporary project for the places of archaeology.

6. Cfr. George Simmel, "La rovina," in *Rivista di Estetica* (ed.) Giovanni Cerchia, no. 8, (1981): 121. [original edition: George Simmel, "Die Ruine," in *Philosophische Kultur* (Leipzig: Gesammelte Essays, 1911), 125-133].

7. For more information, see: Gianluigi De Martino, *Rovine e ruderi: conservazione e progetto* (Roma: Gangemi Editore, 2017).

A first aspect concerns the relationship between memory and amnesia, two concepts that might seem opposite and contrasting, but which, on the contrary, often coexist in the case of ruins, giving rise to interesting design considerations.

The site of the medieval St. Peter's Abbey of Crapolla has been characterized, over time, by a long process of abandonment,[8] which, however, was full of "returns" and active memories. In fact, the religious attractiveness of the ancient site, of great influence over the centuries, and the local identity have never completely failed.

Although it is difficult to see, the ruins of the ancient archaeological artefact are strongly stratified ruins. Through a careful study of the archaeological remains it has been possible to identify traces of different historical and temporal phases, that have condensed within the site, bearing in mind that first information on the Abbey, reported in documentary sources, date back to 1111, although its existence seems very likely already in previous centuries.[9]

In this regard, the observation on-site has demonstrated how, already in the phase of construction of the Abbey dedicated to St. Peter's, *spolia* material was widely reused, defining an accumulation of layers and an intersection of fragments into landscape (Figure 4).

Another example of the overlapping of architectures over time in the same site is the post-war chapel, built in an intermediate position respect to the ancient atrium. The addition of this element involved a reversal in the orientation of the liturgical functions, originally turned towards east and, since 1949, to the west.[10] In fact, to ensure the access to the chapel, near the apses a small entrance was created, along the path that surrounds the church. The uninterrupted use of the chapel over time by the local community constitutes a very significant aspect in relation to the topic of the continuity of worship and of memory, recalling, as Salvatore Settis wrote, that: "memory of what we were, ruins tell us not so much what we are, but what we could be. They are for the community what childhood memories are for the individual".[11] The citizens themselves, but also inhabitants of neighboring municipalities, have never stopped to recognize the religious site as an important place of memory in the territory of the Sorrento Peninsula. The involvement of the local community in the research process has in fact constituted

8. A centuries-old absence of maintenance, together with direct exposure to meteoric agents have now led to an advanced decay of the Abbey of Crapolla. What is still preserved is threatened in a widespread way by the presence of weed vegetation and by the absence of preventive measures of decay.

9. For an analysis of the historiographical sources and of the hypotheses regarding the layout and transformations of the St. Peter's Abbey in Crapolla over the centuries, see: Valentina Russo, "On the edge of a precipice bathed by the sea: a knowledge path for the conservation of the Abbey of St. Peter's in Crapolla", *Arkos*, special number, (July 2010): 70-81; Valentina Russo, "Memory and conservation of fragile ruins. The Abbey of St. Peter in Crapolla", in *Landscape as Architecture*, ed. Russo, 95.

10. cfr. Amedeo Maiuri, *Passeggiate sorrentine* (ed.) B. Iezzi (Sorrento: Franco Di Mauro, 1949), 91-92.

11. "memoria di quel che fummo, le rovine ci dicono non tanto quello che siamo, ma quello che potremmo essere. Sono per la collettività quello che per l'individuo sono le memorie d'infanzia". Salvatore Settis, "Rovine. I simboli della nostra civiltà che rischiano di diventare macerie," *La Repubblica*, Nov (2010).

an important aspect for the definition of the design hypotheses of conservation, reuse and transformation of the area of the St. Peter's Abbey.

Figure 4. *Teodoro Duclère, Drawings of Crapolla's Ruins, 1850; Roberto Pane, Photos of the St. Peter's Abbey Ruins, 1955*
Source: Museo Correale, Sorrento, Tav. CXLV-CXLVI, 1850; Archive Roberto Pane, Crapolla, 1955.

Alongside the memory, intended as a "storage of collective identity",[12] in the case of the Crapolla site, the concept of "amnesia" has even more value, intended, instead, as a manifestation of absence. The term "amnesia" means the double negative of "memory", which involves an absence of memory, something that is not remembered or that has escaped from memories.

"Amnesia, already the subject of studies by Sigmund Freud (Freud 1901), is grafted into the articulated system of memory as an anomaly and, degenerating, can arrive to undermine the 'internal coherence of life'".[13] Therefore, amnesia can be understood as an interruption of memory, a suspension of knowledge, a temporal stop, a lack, a void, placing itself as a possible interpretative tool for the project. Regardless of its duration, it leads to the making of a gap within a sequence of phases and to the removal from reality of a fragment of identity.

When the amnesia concerns the archaeological heritage, it highlights a significant distance between the evolution times of the landscape and the rhythm of the metamorphosis of the ruins.[14] If not considered by a design vision capable of combining all the temporal variables that characterize stratified landscapes, this distance can degenerate into a progressive process of abandonment.

12. "deposito di identità collettiva". Francesco Venezia, *Che cosa è l'architettura. Lezioni, conferenze, un intervento* (Milano: Mondadori Electa, 2011), 92.

13. cfr. Sara Marini, "Amnesia," in *Recycled Theory: Dizionario illustrato* (ed.) Sara Marini and Giovanni Corbellini (Macerata: Quodlibet, 2016), 33-41.

14. cfr. Marcello Barbanera (Ed.) *Relitti riletti. Metamorfosi delle rovine e identità culturale* (Torino: Bollati Boringhieri, 2009).

In the case of the archaeological site of Crapolla, amnesia displays itself respect to what is hidden or has not yet been discovered, to what is absent and presumed, but not certain. It happens in relation to some historical phases and some elements of the Abbey of which fascinating legends are narrated, but of which there is no precise evidence and documentation. An example is the case of the ancient tower, which is said to have been erected in the north-west area of the archaeological site, but of which only a faint memory remains, an absence to be verified.

In this direction, of great importance are the design actions built around the concept of "absence", which have the main aim at transforming absence into presence, placing the interaction between the historiographic function of archaeology and the design mechanisms linked to the topic of imagery and imagination: "the important thing is not what it is seen but what the imagination reconstructs with the mind's eye through a process of transfer which refers to something else. This process is, at the same time, allusion and illusion".[15]

A second relevant aspect, which the condition of the Crapolla's Abbey allows to highlight, is that of the imagination, which precedes the project. The very close relationship with the natural landscape of the Crapolla's Fjord, of which the Abbey is part, has defined an overlap of multiple and different images and imaginaries, which constitute a precious material for the architectural design.

When, from the sea, it is reached the top of the hill where few remains lie, it is found an unexpected, hidden, surprising place, a really "imaginative place", totally absorbed into the surrounding landscape. This same perception of surprise had characterized the photographic images of the early twentieth century taken on the site by Riccardo Filangieri of Candida[16] or those taken by Roberto Pane, who had made the site an original and ideal film set for some short films shot there[17] (Figure 5).

However, it is only by a vision from the top that it is possible to have an overall view of the church and the Abbey and then try to imagine a sort of general plant and individual parts. Only in this way is it possible to see the traces that evoke the ancient system.

It is of great importance to keep in mind the imaginative force produced by the traces, the alignments, the rhythmic sequences of the ruins, eloquent fragments of lost architecture and for this reason capable of generating new figures and new shapes.[18] In this condition, the invisible archaeology, dipped in nature, can be imagined as a real "landscape capacitors"[19] or even as a "mnemonic landscape".[20]

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15. Caravaggi and Morelli, *Paesaggi dell'archeologia invisibile*, 13.

16. cfr. Riccardo Filangieri di Candida, *Sorrento e la sua penisola* (Bergamo: Istituto Italiano d'Arti Grafiche, 1917).

17. cfr. *Archive Roberto Pane*, Crapolla, 1955; cfr. *Archive Storico Luce*, Penisola sorrentina, 1950.

18. cfr. Tessa Matteini, *Paesaggi del tempo. Documenti archeologici e rovine artificiali nel disegno di giardini e paesaggi* (Firenze: Alinea, 2009).

19. Caravaggi and Morelli, *Paesaggi dell'archeologia invisibile*, 24.

20. In this direction, it can be remembered the Greek lyric poet Simonide di Cheo (556 - 468 BC), considered the founder of mnemonics techniques, who experienced that memory operates visually, through logical and ordered sequences of images and that their precise arrangement is an

Figure 5. *Roberto Pane, Short Films, 1950*
Source: Archive Storico Luce, Penisola sorrentina, 1950.

Mnemonics, also known as the "art of space", is a so-called "topical" strategy, because it consists in preserving all the things that must be remembered in the *topoi* or *loci*, a sort of familiar places: "this allows to attribute a precise image to everything, which, in this case, is called *imago agens*, that is an image that acts to recall the object that must be brought back to memory. This second phase is the result of imagination, or *phantasia*. This art therefore implies a mnemonic landscape, in which everything that must be remembered present a precise location".[21]

In this direction and in order to focus attention on the crossing of memory and imagination, it is possible to refer to Juhani Pallasmaa who, starting from Gaston Bachelard's[22] distinction between "formal imagination" and "material imagination", argues that "images that arise from matter show experiences, memories, associations and emotions that are deeper and more touching than those evoked by the shape".[23] So, he speaks of fragment, collage and discontinuity in the architectural

indispensable condition to guarantee a certain remembrance. Cfr. Maria Clara Ruggieri Tricoli and Maria Desirée Vacirca, *L'idea di museo. Archetipi della comunicazione museale nel mondo antico* (Milano: Lybra Immagine, 1998).

21. cfr. Santina Di Salvo, *Luce e colori sulle rovine. Strategie museografiche per la comunicazione dell'archeologia* (Roma: Aracne, 2012), 31.

22. Gaston Bachelard, *The poetic of space* (Bari: Dedalo, 2011).

23. Juhani Pallasmaa, *Frammenti. Collage e discontinuità nell'immaginario architettonico* (Pordenone: Giavedoni, 2012), 50.

imagery, underlining the need to operate towards an "open, unfinished reality, associations of ideas, memories, the concept of collage and assemblage".[24] In another circumstance he stresses again that: "the restoration of Castelvecchio (1956-64) by Carlo Scarpa in Verona, the transformation by Sverre Fehn of the ruins of the Archbishop's Museum in Hemar (1967-1979) and the recent David Chipperfield's reconstruction of the destroyed Neues Museum in Berlin (2009) are among the most extraordinary examples of architectural collages that emerged through a sensitive and deep architectural design".[25]

Pallasmaa's considerations invite to think about the importance of the "imagery" and "material imagination" and on how narrative techniques and cinematographic *montage* can be able to define an archaeological density of the imagery and a hybrid narrativity, through the juxtaposition of fragmented images deriving from non-linear origins, providing interesting design possibilities.

Starting from these considerations, it is possible to understand how the archaeological evidence, even if invisible, can find through the architectural design a new creative capacity and new constructive possibilities for the contemporary space. This can happen through the reinterpretation of traces, locations, dimensions or the definition of new spatial associations, in relation to different time periods and to the changes of the environmental contexts, "avoiding the interpretative accentuation of the 'shape' (stylistically understood) of the single objects"[26].

In these cases, the enhancement of the site is pursued through the insertion of new elements that give a new interpretation of the landscape traces belonging to different temporalities of the findings. These signs, these elements cannot be interpreted in an arbitrary way, but, as Andrea Carandini underlines in a more general reflection: "the new elements could arise from the hidden, the obvious from the secret and the transformation of the existing would not be based on a quick and intuitive synthesis, but on solid knowledge bases, where detail is considered as an indication of a system to be reinvented".[27]

The intent of an architectural approach, conceived in this way, referred to the sensitive topic of invisible archaeology, that the case of Crapolla's Abbey highlights, cannot be that to affirm its own supremacy over the past, but rather to strengthen the unity of nature and artifice and to narrate the continuous sequences of a possible uninterrupted tale of memories and amnesias, since, as Cesare Pavese wrote, "amazement is made of memory rather than novelty".[28]

It is possible to mention the intervention by Toni Gironès Saderra for the Roman Theater in Tarragona (2018),[29] where the construction of a structure in corrugated steel rods defines the generators lines that raised in volume part of the remains of the theater. "Like a cloud of flocks and by reversing what is static (the

24. *Ibidem.*

25. Pallasmaa, *Frammenti*, 50-51.

26. Caravaggi and Morelli, *Paesaggi dell'archeologia invisibile*, 25.

27. cfr. Andrea Carandini, *La forza del contesto* (Bari-Roma: Editori Laterza, 2017).

28. Cesare Pavese, *Il mestiere di vivere: diario 1935-1950*, (Torino: Einaudi, 2000), 241.

29. cfr. Toni Gironès Saderra, "Restituzione del Teatro Romano di Tarragona, Spagna," *Casabella*, no. 898 (2019): 44-51.

observer) and what is in movement (the choreography of birds in motion) the tangential visions of successive alignments build the shadow of the old theater starting from the experience of visitors as new contemporary spectators".[30] The intervention highlights a very important aspect in relation to the design logic experienced for the Crapolla's site, that is the experiential narrative of the archaeological site which, starting from an evocative-imaginative mechanism and through the insertion of light and changeable elements, tries to evoke the void that the ruin shows, making some parts of the ancient complex legible and visible and defining spatial episodes (Figure 6).

Figure 6. *Roman Theater in Tarragona, Toni Gironès Saderra, 2018*
Source: Casabella, n. 898, 2019, p. 49.

In this way it is possible to imagine new or ancient futures and to provide new meaning to the ruins of the past, through an architectural project intended as a building site of knowledge in progress, as the result of mutual intersections between different disciplines, becoming a kind of a scaffolding for archaeology into the landscape.

A New Scaffolding in the Landscape

Starting from the previous considerations, the design approach for the enhancement of the archaeological site of Crapolla, proposed in the research work, took into consideration a multiplicity of aspects: firstly, the incompleteness of the knowledge relating to the site, especially the archaeological one, and the value of the social identity, recognized by the local community, that the religious place has maintained over time; then, the "non-recognizability" of the ruins of the Abbey in

30. *Ibidem.*

the current condition in which the dominance of the strong value of the multiple perceptions of the landscape is felt. Finally, the aspect referred to the possibility of using a mechanism of imagination that could, on the one hand, tell the space in ruins, on the other, direct it towards new possibilities.

In this situation, where there is the necessity of waiting for knowledge deriving from different studies in progress, becomes important to consider very different ideas, but also, at the same time, to be able to refer to this articulated framework some precise design actions. In particular, the need to better understand the site, in the waiting of the archaeological excavations or during the first archaeological excavations in progress and, at the same time, the continuous dialogue, during the research, with the local community, constituted two important aspects that influenced the design process.

In the research work, these very problematic assumptions have not been taken into consideration in an abstract way. They have been faced as a reply to existing needs, which have made the conservation and the re-use of the site very difficult and in this main aspect lies the originality of the whole design operation. These real needs mainly concerned the issues related to the securing of the site; the protection of some elements, such as the found frescoes; the accessibility on a large scale, but also the necessity to introduce public facilities, in order to improve knowledge and usability of the site. All these needs are intertwined with the demand to continue the investigations on site with further researches, especially, as said, through the archaeological excavations in progress (Figure 7).

Giving answers to these needs has meant addressing the topic of the contemporary intervention in the ancient matter, defining a close dialogue with the fragile ruins and with the landscape. A dialogue that has imposed, in compliance with the principles of reversibility and recognition of the new intervention, a careful work of correlation and comparison between the new elements to be inserted and the ruins of the Abbey.

In this direction, the parallel with the project made by Álvaro Siza Vieira and Roberto Collovà for the valorization of Piazza Alicia and the reconstruction of the Salemi's Church (1984-1997)[31] can be very useful for illustrating the design logic that has been introduced in the architectural hypothesis proposed for Crapolla. In Salemi the condition of ruin is caused by the earthquake, in Crapolla, instead, by time and by the lack of physically recognizable elements. The intervention of Siza and Collovà had the goal, through the inclusion of a few essential elements, to reconnect the relationship between the fragmented parts and, at the same time, to achieve a continuity between old and new architecture. This action has given unity and coherence to the general intervention.

31. The reconstruction project for Salemi was concieved by Álvaro Siza Vieria and Roberto Collovà, starting from the studies for the Belice Design Laboratory with the collaboration of the Technical Department of Culture of Mazzara del Vallo. The executive project, commissioned by the Curia of Mazzara del Vallo, concerns the Church, but also outlines interesting indications for possible future interventions in the historic center. See: Rosa Tamborrino, "Invisible thresholds: the reconstruction project of the Mother Church in Salemi di Collovà and Siza Vieira", *Restauro e città* (1989): 82-93.

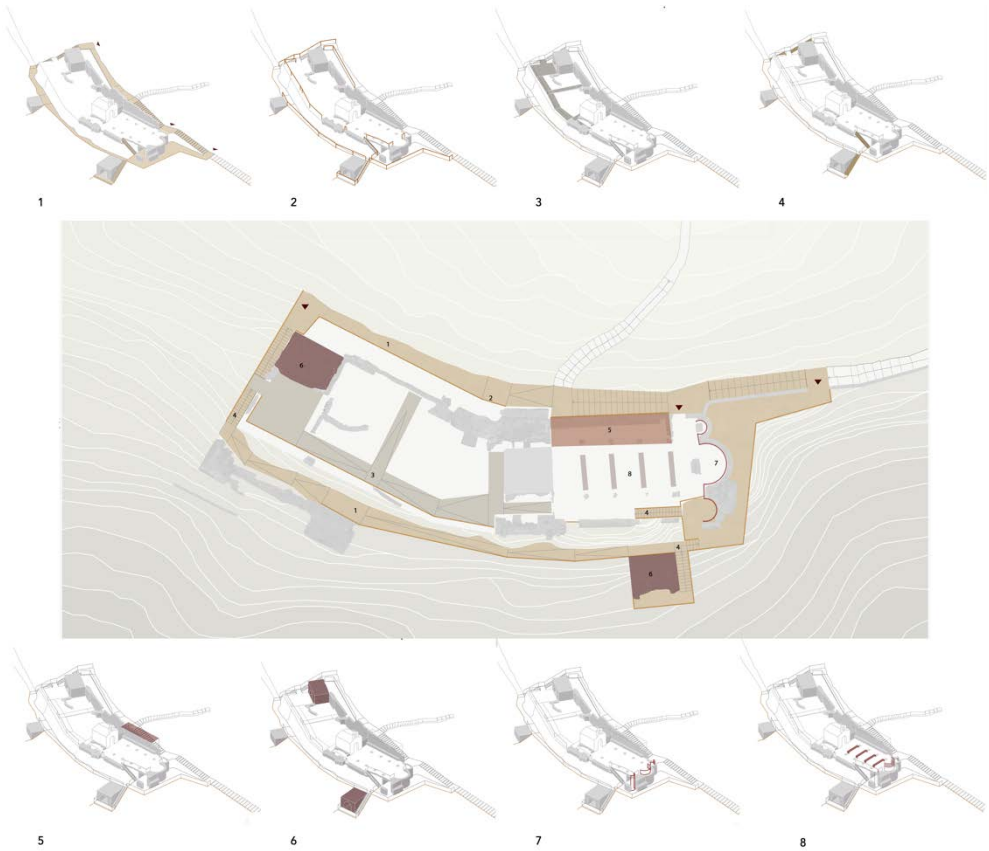

Figure 7. *General Strategy Concept, 2017*
Source: Drawings done by the research group for architectural design aspects: Pasquale Miano (coordinator), Francesca Coppolino, Angela Spinelli, 2017.

It seems possible to paraphrase Renato Bocchi's formula of "architecture as a framework to experience landscape", speaking of "architecture as a framework to experience archaeology".[32] Designing landscape means designing a complex spatial system, subject to constant change, and also to a continuous variability of perceptions according to the movement of those who experience the landscape.

Bocchi's reflection, in this design research, allows to emphasize how there is no contrast, but a combination between the shapes of architecture and those of archaeology: architecture is a scaffolding, a framework with its own specific structure designed to read, interpret and narrate the archaeology, but not to compromise its shapes.[33]

Starting from the ruin-nature unity that has been achieved in the Crapolla's archaeological site, the aim of the proposed architectural hypothesis was to realize a new unity in which the new inserted elements define, above all, a condition of internal coherence, which, at the same time, is able not to alter, but rather to strengthen, the ruin-nature unity from which it is started.

32. Renato Bocchi, "Le strutture narrative e il progetto di paesaggio," in *Il Parco dell'Ariosto e del Boiardo. Progetti di luoghi come esercizi di fantasia*, ed. Carlo Olmi (Macerata: Quodlibet, 2010), 41.

33. *Ibid*, 60.

Realizing a condition of coherence between the new grafted elements, for examples, a walkway, a connection path between different heights, a small roof, a light railing, small volumes, meant interpreting the different elements as a unitary plot of interconnected elements, through which establish relationships with the ancient traces, without prevailing it (Figure 8).

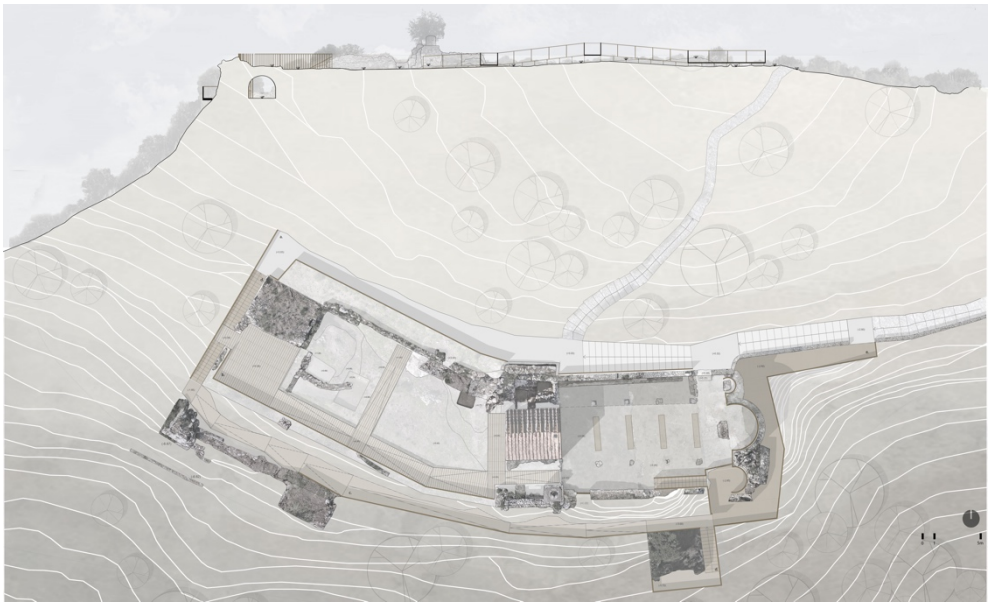

Figure 8. *Project Proposal: General Plan and Section, 2017*
Source: Drawings done by the research group for architectural design aspects: Pasquale Miano (coordinator), Francesca Coppolino, Angela Spinelli, 2017.

The work of the historical reconstruction of previous strata and layers is intersected with the securing project of the site, by engaging design steps that move between the invisible and the visible and that are inspired by existing signs, starting from which a new contemporary element, consistent as a whole, is grafted.

So, in the design explorations related to the area of the Abbey of Crapolla, was tried to act through the "light grafting into the landscape" of a few and precise elements necessary to protect the site and to ensure adequate use.

A "wrapping" of the site of the Abbey was proposed, which could enhance its consolidated role as a crossroads of paths coming from the sea and the hills, improving its accessibility.

Along the two parallel paths that could take place above and below the Abbey, with exceptional views of the landscape, the existing entrance at the altar can be maintained and two new entrances can be inserted: a first access which, by arriving behind the apses of the church, allow to reach directly the roman crypt and then go up towards the church; a second access, instead, provided near the cistern located to the north-west, could allow to enter the complex from the cloister side.

Basically, the limited new connections realized by these paths, largely already traced, could improve the usability of the site, but also could allow to protect the

site, through the introduction of railings along the two paths and the reuse of the pre-existing staircases of access to the crypt and to the Abbey spaces.

Overall, it can be possible, in compliance with the inevitable problematics of the site, to safely access the interior spaces of the Abbey and the church from different levels. In particular, in the interior spaces it could be possible to define a unitary connection on several levels able to connect the church with the Abbey area, the crypt and the cistern.

The path through the ruins of the Abbey could find in the so-called cistern, a first information point in which to place didactic and informative supports aimed at illustrating the historical events and architectural features of the religious complex.

The exploration of the parts down of the Abbey, towards the sea, will allow to define new directions for the visit connecting the floor of the cloister and the lower levels. The crossing of the mentioned court will allow to explore the ruins corresponding to the interior and exterior spaces of the Abbey.

A further vertical connection could still be necessary to connect the floor of the church with the basement placed below the transept and between this one and the low cistern, now almost inaccessible. Finally, the basement may constitute the suitable place for the insertion of exhibition elements and dissemination supports about the Abbey complex and the Crapolla site.

A very close relationship can be implemented between the safety railings of the upper path and a roof to protect the frescoes, found along the perimeter walls of the church.

The internal ramp leading to the Abbey spaces could be conceived in close interaction with the progress of the archaeological excavations, for which a modular floating floor can be considered which, depending on the excavation areas, will be moved to the best appropriate position.

At this point, but without any discontinuity with the described proposal for accessibility and securing, some design considerations can be advanced relating to the readability and use of spaces.

The substantial change introduced with the construction of the small post-war chapel led to the creation of a very particular religious space, with the altar and the apses opposed to the chapel, generating a contrast between ancient and contemporary religious rites, which is configured as a peculiarity to preserve.

It appeared interesting to suggest some architectural solutions able of helping to read the layout of the ancient church, such as, for example, the anastylosis of the ancient columns based on the procedures of the restoration discipline, but also the definition of a new “scene”, a sort of light wall of background, in correspondence of the apses, which supports their identification (Figure 9). This intervention can also be thought of in continuity with the railings and the roof, mentioned earlier, so once again the design action primarily answers to the goal of securing and protecting the area.

On the other hand, it is also possible, by modifying its height and material consistency, to conceive the “scene” as a screen for projections or as a background for small concerts, also introducing a secular use of the ancient religious space.

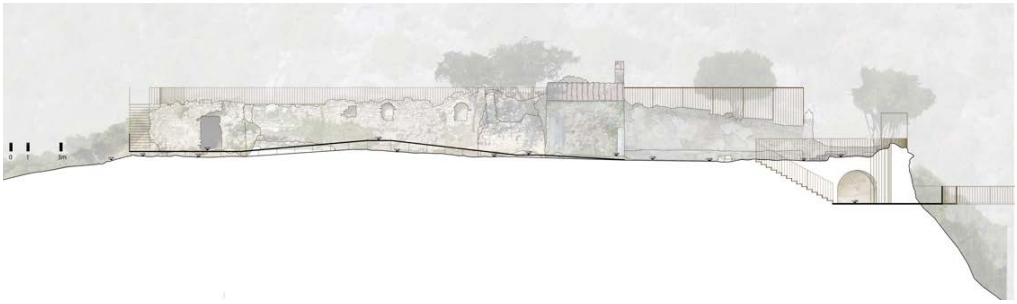

Figure 9. *Light Grafting into Landscape: Longitudinal Section, 2017*
Source: Drawings done by the research group for architectural design aspects: Pasquale Miano (coordinator), Francesca Coppolino, Angela Spinelli, 2017.

It could be possible to create a light exhibition set-up to complete the requirements for accessibility and safety, also providing for the insertion of linear steel elements in the church, which can be used as seats for both religious ceremonies and for concerts. Also, the cisterns could be used as exhibition spaces, through the insertion of a few removable and recognizable elements.

On a larger scale, the issue of visitor facilities must finally be taken into consideration. It is a relevant issue, which cannot be addressed only by considering the fragile site of the Abbey, but referring to the entire scale of the Fjord.

Designing the unity of the architectural elements and, at the same time, their total recognition and reversibility is a very sensitive goal, which requires deep studies and considerations that can only be achieved in the detailed phases of the project. From this perspective, the final choice of materials to be used will be the outcome of a long and articulated process, in which the various alternatives can also be evaluated through field trials.

In the research phase, aware that several alternatives will usefully be considered, with the development of excavations and knowledge, the introduction of some materials was proposed: the beaten earth for the paths that surround the site, providing joint treatments for safety, with the introduction of stone curbs; bronzed steel for the railings, roofs, ramps and stairs, in order to obtain spaces which reveal their difference, without contrasting with the context; steel for the construction of the internal floating carpet and the new connection path along the edge of the apses with the definition of a grid and, where necessary, of a slab (Figure 10).

Of course, each hypothesis has to be measured in relation to the findings of the ongoing archaeological exavation campaigns, and always taking into consideration the necessity to choose reversible and flexible systems according to the changing requirements of the archaeological excavation site.

Figure 10. *Light Grafting into Landscape: Vision of the "Scene" between the Absent Apses and Vision of the Flexible Platform between Archaeological Excavations, 2017*
Source: Drawings done by the research group for architectural design aspects: Pasquale Miano (coordinator), Francesca Coppolino, Angela Spinelli, 2017.

In this regard, it is important to underline that, in the design solutions, particular attention should be paid to the requirement of modularity, to facilitate working aspects, such as transport, assembly and disassembly, reusability; but also, to the requirement of maintainability and of easy inspection and, above all, to the requirement of flexibility and reversibility of the new contemporary "layer" to be introduced. It should be a non-definitive layer, open to new possible changes deriving from the evolution of research and new archaeological findings, which may also significantly revise the project.

The research work on the Abbey of Crapolla could further continue, by deepening the field of knowledge relating to the archaeological site in the north-eastern part of the complex, not yet examined, but also relating to the many archaeological paths to be defined towards the coast and the center of the town.

These last considerations are really important since they raise the issue of the adaptation the architectural configuration to the changing reality of archaeological sites and to the evolutionary process of scientific research.

As Marguerite Yourcenar, speaking of the "time, great sculptor", remembers: "from the day the sculpture is finished, in a certain way, its life begins, a second phase, over the centuries […] an alternation of adoration, admiration, love, contempt or indifference, by successive degrees of erosion and wear, will gradually bring it back to the state of shapeless material from which the sculptor had stolen it [...] Some of these modifications are sublime. To the beauty, desired by a human brain, by an era, by a particular form of society, we add an involuntary beauty, associated with the events of history, due to the effects of natural causes and time. Broken sculptures so well that from the ruin a new work is born, perfect in its own segmentation".[34]

34. cfr. Marguerite Yourcenar, *Il tempo, grande scultore* (Torino: Einaudi, 1985).

Marguerite Yourcenar's "time great sculptor" acts on the physical consistency of architectures, modifying the "matter of its shape: matter of uncertainty"[35] and defining an involuntary beauty. This matter, initially conceived as a construction of solidity, synonymous of eternity and duration, is now found as malleable, undergoing a metamorphosis, in which with the term "metamorphosis"[36] is meant to reveal the constantly open and developing aspect of the archaeological ruin.

Conclusions: The Project as an Open Work

The St. Peter's Abbey in Crapolla has constituted a real interdisciplinary research field, where knowledge has represented the common goal and where elements and considerations that have originated from the different contributions - from archaeological excavations to surveys, from studies on construction techniques to those on *spolia* architecture, from landscape studies to geological ones - have become basic aspects for the project work. In this case, it is necessary that the architectural design has to be constantly updated and integrated, assuming the connotations of an open project in all the phases, from the initial setting up to the daily work on site.

In particular, two aspects played a significant role in the definition of the design approach: the development of the archaeological excavations during the design process and the involvement of the local community. The archaeological excavations have constituted the main tool of knowledge for the site and, therefore, the central element around which the various design hypotheses taken into consideration turn on, which have been modified, integrated and updated with the changing situation due to the excavations in progress. The further aspect that influenced the design process concerned the involvement of the local community in the definition of the strategy and of the architectural interventions for the valorization of the site. In fact, is has been developed a continuous exchange of ideas and a rich dialogue with local community that took place at various moments of the research, through meetings, conferences and collective site inspections.

Starting from these considerations, the proposed design strategy for the fragile heritage of the arcaeological site of Crapolla suggests and defines a unitary, layered architectural system, whose "image" shows all its autonomy and recognizability, without marking formal mimesis respect to the ancient material. A "light" architectural graft that tries to blend itself into the landscape in a harmonious way, without renouncing to act as a "new architectural sign in the stratification process".[37] An articulated and reversible architectural system, almost ephemeral, which can change itself with the changing archaeological excavation

35. cfr. Paul Valery, *Eupalino o dell'architettura* (Lanciano: Barabba, 1932).

36. From the Greek *metamórphōsis*, which derives from *metamorphôun* transform, composed of *metá*, which indicates transformation, and *morphē*, form.

37. Franco Purini, "Il nuovo e tre forme dell'antico," in *La modernità delle rovine. Temi e figure dell'architettura contemporanea* (ed.) Stefano Bigiotti and Enrica Corvino (Roma: Prospettive Edizioni, 2015), 80.

campaigns and with the storytelling site museum requirements, taking the connotation of a "permanent transitory device", a device in continuous evolution, a sort of a scaffolding of archaeology into the landscape.

Finally, the archaeological site of the St. Peter's Abbey in the Fjord of Crapolla is configured as a study case able of enhancing the cognitive character of the architectural project, not only for its intrinsic specificity, but also for the ability to correlate and synthesize research results from different disciplines.

Through the illustrated design strategy, it has been possible to highlight the importance of the process in the architectural project that operates in archaeological contexts: a process linked to the dynamics of excavation, to the progress of knowledge, to the interlocution with the community and the municipality and to the progressive interactions between different knowledge. All these variables are essential elements in trying to define an architectural design aimed at enhancing these particular and hidden sites, but which is open to possible future discoveries into the archaeological landscape, configuring itself as a "building site of knowledge" in progress.

Acknowledgments

The article is the result of a common research work by the two authors. Nonetheless, the paragraphs Introduction and A new scaffolding in the landscape are to be attributed to P. Miano, the paragraphs Invisible archaeology between amnesia and imagery and Conclusions: the project as an open work are to be attributed to F. Coppolino.

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Athens Journal of Architecture - Volume 10, Issue 1, January 2024 – Pages 55-85
(received: 1 December 2022, received in revised form: 28 July 2023, accepted: 25 September 2023)

In-between Institutional Religion and Folk Faith during the Transition into a Modern Political System – The Case of Giam Temples in Taiwan

By Yan-Bo Chen[*]

"Giam" 巖 is a popular type of temple in Taiwan, also called "Giam-a", referring to religious architecture related the concept of "mountains". This type of temple was initially recorded as a geographical landscape or scenic attraction and was subsequently extended to indicate a specific form of worship space. This study explores the Giam architecture under the intervention of state power. The intervention process could be divided into two stages. The first stage involved the Investigation of Traditional Customs during the Japanese rule. The second stage involved interventions by the Buddhist Association of the Republic of China (BAROC) after World War II. This study depicts three significant Giam temple cases in Taiwan. From the perspective of spatial layout, architectural form, and ritual, discusses the development results of the Giam temple after the modern state system intervenes in religious affairs. Some Giam temples have made their choice between the folk beliefs and Buddhist beliefs as an adjustment, and others have still coexisted with both religious by separated them with spatial layout and different architectural style. The diverse sociocultural characteristic of the mountains makes the religious in it become the nexus of local power. So, as the state system and policy change, those religious spaces also need to change in some way, adjusting to balance the state and local power.

Introduction

As worshipped objects and sacred symbols, mountain ranges are a phenomenon across ethnic groups, geographic regions, and religions. For mankind, the summit of a mountain range is what gives it sanctity, because its height is considered by people as being proximate to heaven or the spiritual world of a religion.[1] Given that the summit is regarded as the closest place to the celestial realm, mountain ranges are also seen as a place for revelation and inspiration. For

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1. Naess Arne, "Mountains and Mythology," *The Trumpter: Journal of Ecosophy* 12, no. 4 (1995): 1-3.

example, the Judaist prophet Moses had his revelation at Mount Sinai, while Muhammad received Allah's message in Jabal al-Nour.[2] Regarding community identity, the scenery of the mountains is shared by people from a particular region or settlement, and the surrounding social network is connected by mountain ranges and terrains through a particular cultural context. The ancestral origin and survival knowledge are also reflected in the terrain's oral stories, which serve as the link between history, landscape, and culture.[3] In addition, pilgrimages to mountain ranges provide a religious experience of detachment, where entering the mountain range symbolizes the entrance to another world, followed by rebirth following the pilgrimage.[4]

"*Giam*" (巖in Mandarin Chinese), known as "*Giam-a*" (巖仔 in Taiwanese Hokkien), refers to religious buildings related to the concept of "mountain." These buildings combined the features of the conception of incense[5] and egoism[6] in folk religion through worshipping Buddhist deities such as the "Buddhas", "*Guanyin*" 觀音, and famous monks such as "*Qingshui Zush*i"清水祖師 and "*Xianying Zushi*" 顯應祖師. Making use of natural terrain, some of them are built as ritual sites in grottos and caves (Figure 1), or as temples in different spots on mountain ranges such as piedmonts, hillsides, or summits (Figure 2), while others are located at the center of migrant settlements, serving as transplants of hometown religions. Initially, Giam referred to a particular terrain or landscape featuring a flatland next to a mountain that is suitable for human habitation. Combining religion with a landscape with aesthetic beauty resulted in the creation of a sacred space with unique significance. The intervention of a contemporary administration during the period of Japanese control in Taiwan, in which the Buddhist component was deliberately emphasized, turned this coexistence of religious attributes to antagonism.

The religious attributes of the Giam Temples range itself can be categorized

2. Messerli Bruno and Jack D. Ives, *Mountains of the World: A Global Priority* (New York: Parthenon Publicarion, 1997), 39-54.

3. Dillehay, Tom D., "Mounds of social death: Araucanian funeraruries and political succession", T. Dillehay Ed, In *Tombs for the Living: Andean Mortuary Practices* (Washington: Dumbarton Oaks, 1995), 281-314.

4. Olsen Brad, *Sacred Places Around the World: 108 Destinations* (San Francisco: CCC Publishing, 2008) 34–83.

5. Taiwanese folk belief regards the smoke from burning spices as a symbol of spiritual power transmission from the gods.

6. For Taiwanese people, they often hope that their prayers to the gods will come true.

into two forms. The first is institutional religion, in which the dogmas, religious leaders, scriptures, rituals, behaviors, hierarchies, and organizations are clear and independent, with fixed venues and religious activities; and the second is diffused religion, in which the objects of worship, dogmas, or scriptures are not fixed, and its denominations and affiliations are blended into everyday lives and customs, tending toward efficacy and egoism.[7] Institutional religion typically refers to faiths with fully developed institutions, such as Buddhism, Taoism, Christianity, and Islam, whereas diffused religions reflect local and ancient primitive or folk religions. Foreign religions frequently seek commonalities with indigenous religions in order to create ties with the latter before superimposing over them and evolving into localized religions. When Buddhism was introduced to China, it also absorbed many of the characteristics of local Chinese folk religions and became a "folkized" form of Buddhism. This type of Buddhism was also brought to Taiwan along with Chinese immigrants. However, when either is strengthened by historical context or political influence, they may end up in a tug-of-war against each other.

This study uses three significant Giam temples cases: *Puanthinn-Giam*半天巖 in Chiayi, *Tshuiping-Giam* 翠屏巖 in Kaohsiung, and *Kangsuann-Giam*崗山巖 in Kaohsiung. The abbots and monks of these three Giam temples were associated with the lineage of Tu-kang-suann during the Japanese rule and the thread of precept transmission at Taisian Giam after World War II. This study analyzes the relationship between these three Giam temples and the intervention of state power from three dimensions: spatial layout, architectural form, and ritual. Under the intervention of state power, these three Giam temples were faced with the choices of "folk religion" or "Buddhism". The two options compelled them to make compromises and adjustments that were fully reflected in the aforementioned dimensions.

Figure 1. *Xiandong Giam Built in the Cave*
Source: Author, 2021.

Figure 2. *Yushan Giam Built by the Mountain*
Source: Author, 2021.

7. C. K. Yang, *Religion in Chinese Society: A Study of Contemporary Functions of Religion and Some of Their Historical Factors* (University of California Press, 1987).

"Giam" Temples

Initially, Giam referred to a particular terrain or landscape featuring a flatland next to a mountain that is suitable for human habitation. "*Shuowen Jiezi*" 說文解字[8](Explain Text) described this word as "referring to the bank of a hill, it has the radical 山 (literally means 'mountain') and it is pronounced as嚴 (yán)[9]." The Quing Dynasty philologist "*Duan Yu-Zai*" 段玉裁 further clarified the definition of this word in his "*Annotated Shuowen Jiezi*" 說文解字注 as "a place next to mountain ranges and rocks that is suitable for human habitation." The "*Chronicles of Anxi County*"安溪縣志 in Ming Dynasty treated famous local Giam as scenic sites and described them as "mountains filled with bountiful natural resources and rocks, frequented by intellectuals for their scenic beauty and inspiration." It also recorded "the twenty-four most famous Giam along the cliffs and precipices of Anxi area." Among the 24 *Giam*, some were rocks with exotic shapes, such as *Qinglin Giam*青林巖 with its stalagmites; some became sacred sites after being used by revered monks for monasticism, such as *Qingshui Giam*清水巖, *Taihu Giam*太湖巖, and *Taishan Giam*泰山巖; some had monasteries built at the piedmonts, like the Three Monasteries at *Ruilian Giam*瑞蓮巖; some were pathways to transcending into celestial beings, such as *Xiangu Giam* 仙姑巖 where a grand temple was built after a lady became immortal after entering and picking flowers.

Since 1995, Lin Mei-Rong has been studying Giam of various sizes across Taiwan using an anthropological approach, and has applied "Folk Buddhism" as the perspective of her research. She undertook Giam as the research object to illustrate the history and aspects of Folk Buddhism in Taiwan. She believes that the religious model of Giam represents a mode of assimilation, where people incorporate

8. Shuowen Jiezi is an ancient Chinese dictionary compiled by Xu Shen during the Eastern Han dynasty.

9. The original content is "岸也从山嚴聲". "Yan" is the way of pronunciation in Beijing, and "Giam" is the way of pronunciation in Fujian. The two pronunciations refer to the same word.

Buddhism into the system of a folk religion and turn it into a public religion, often resulting in conflicts caused by the opposition toward orthodox Buddhists.[10] In Lin Mei-Rong's research, there are differences in the architectural forms used in Giam, Folk Belief Temples, and Buddhist Monasteries, but this difference and the use of space are not discussed further. Therefore, this study hopes to conduct research and description on architecture and space.

The gods of Buddhism worshiped in the rituals of folk beliefs, showing the characteristics of the fusion about the two religious attributes, and the two religious attributes have disputes with the historical development. The religious beliefs of *Giam-a* and Guanyin are interconnected to a certain extent, where Guanyin is considered a goddess and worshipped in temples with upward-curving roof ridges, and many *Giam-a* continue to follow the practice of burning joss paper. Evidently, some *Giam-a* became village temples, joint communal temples, grand temples, and neighborhood or surname temples, while others became regional religious centers for multiple townships. These are demonstrations of the model of the popularization of Buddhism.[11] During the Ming and Qing dynasties, Buddhism underwent a phase of localized development that created the groundwork for its "Folk Buddhism" characteristic. During the period of Japanese administration, it underwent changes in which it became similar to Japanese Buddhism and folk religions. After World War II, Taiwanese Buddhism underwent a new phase of development in terms of political ideology and the "orthodoxy– heresy" denomination, a tendency that inspired and altered several views of Giam.[12]

Impact of the State on Giam

The Buddhist aspect of the syncretic "Giam" became prominent when state governance was introduced in Taiwan. Registration and investigation policies implemented during Japanese rule initiated the religious categorization of Taiwanese temples. Local Taiwanese began to join specific Japanese Buddhist sects, and later,

10. Lin Mei-Rong, "Folk Buddhism as seen in Giam-a Temples of Southern Taiwan", *Thought and Words: Journal of the Humanities and Social Science* 33, no. 2 (1995): 1-40.

Lin Mei-Rong, "The tradition and changes of Taiwan's native Buddhism: .A survey of Giam-a. In National Taiwan Normal University", Proceedings of the *1st Taiwan Native Culture Symposium* (Taipei: Buddhist Youth Foundation, 1995), 701-722.

11. Lin Mei-Rong, Su Quan-Zheng. "The Tradition of Folk Buddhism in Taiwan as Revealed in the Kuan-yin Belief in Giam-a (Mountain Temples) and its Social Practice", *New Century Religious Study* 2, no. 3 (2004): 1-34.

12. Su, Chuan-Cheng, *A Study on the belief of "Giam-a" folk Buddhism in Taiwan* (Department of History, National Chung Hsing University, 2001).

the "*Myōshin-ji branch of the Rinzai sect*"臨濟宗妙心寺派 sent Tōkai Gisei東海宜誠 as a missionary, and influenced the Buddhist and Giam temples in southern Taiwan at that time through their control over "*Dagang Shan sect*"大崗山派. Under Kuomintang's martial law regime after World War II, the Buddhist Association of the Republic of China (BAROC) obtained control over *Dagang Shan sect* through the transmission of Buddhist precepts, and served as a medium of collaboration and dialogue with the government during the imposition of martial law and anti-rebellion provisions. The abbots or monks of these Giam were also linked with BAROC, and brought political influence to the Giam, which was once the center of local religious beliefs.

Religious Policy of the Japanese Colonial Government

The colonial government adopted a non-involvement and non-interventionist religious policy of "keeping pre-existing customs" during the early years of Japanese rule,[13] which had a crucial impact on the pre-existing religions in Taiwan. Japan began sending Buddhist missionaries to Taiwan. The compatibility of the system and features of local and foreign Buddhist sects directly affected the spread of Japanese Buddhist sects in Taiwan.[14] For this reason, *Rinzai sect* 臨濟宗 and *Sōtō sect* 曹洞宗 were the more accepted Japanese Buddhist sects in Taiwan. The five major traditional Buddhist sects in Taiwan established in early Japanese rule were branches that originated from *Gushan Yongquan Temple* 鼓山湧泉寺 in *Fujian* 福建. They merged the arrangement pattern of sculptures in traditional Chinese Buddhism with particular Japanese Buddhist ceremonies and invited monks from both mainland China and Japan to preach. Buddhism in Taiwan at this period sparked the new monastery construction movement and had an increase in Buddhist monks' knowledge and self-cultivation. The Dagang Shan Chaofeng sect was from Gangshan Giam, while the Lingyun Temple was from Nei Giam, commonly known as Mount Guanyin in Wugu. In this historical setting, these facts demonstrate the ascendance of Buddhism in Giam. In addition to local Buddhist sects, the arrival of

13. Tsai Chin-Tang, *The Religious Policies in Taiwan under the Imperialistic Rule of Japan* (Department of History, University of Tsukuba, 1994), 18.

14. Wu Min-Xia. *Taiwanese Buddhism during the Japanese occupation period* (Taichung: Taiping Ciguang Temple, 2007), 29.

Japanese architecture had an impact on the design of Buddhist monasteries.[15]

After the Tapani Incident,[16] the Japanese government launched an investigation on folk religion in Taiwan, which saw a number of Giam being included under the *Myōshin-ji branch of Rinzai sect*. The origin of this branch can be traced to the early years of Japanese rule, when local Taiwanese temples established head-branch relationships with Japanese religious groups to protect the properties owned by local temples during the change in regime.[17] As local temples typically visited Gushan to receive precepts during Qing Dynasty,[18] they naturally interacted with the Japanese Rinzai and Sōtō sects.[19] *Yu Qingfang* 余清芳 constructed the Tapani Incident in 1915 in the name of Wang Ye's divine will and the teachings of the vegetarian religion to appeal to the general population. As a result of the incident, the colonial authorities initiated a comprehensive inquiry into the "pre-existing traditions" of local religion (Tsai Chin-Tang, 1994). In April 1916, *Marui Keijirō* 丸井圭志郎 commissioned local government officials, public sect staff, and police officers to compile a registry of temples,[20] which took a year to complete. At the same time, Hase Jien, abbot of Taipei's Linji Huguo Temple (also known as Rinzai Gokoku-ji during Japanese colonial era), sought to expand the influence of the Rinzai sect in Taiwan and subsequently cooperated with Marui by arranging a visit to southern China and Japan for *Shi Chuanfong* 釋傳芳, *Shi Benyuan*釋本圓 and *Shi Chengyuan* 釋成圓, and facilitated *Kaiyuan Temple*開元寺, Chaofeng Temple超峰寺, Zhuxi Temple竹溪寺, *Chishan Longhu Giam*赤山龍湖巖, *Daxian Giam*大仙巖, *Lingyun Temple*凌雲寺 of Mount Guanyin and Xiyun Giam Temple toward becoming the liaison temples of

15. Huang Lan-Shiang, "Traditional Buddhist Monasteries in Taiwan during the Qing Dynasty and their Transformation under Jaese Colonialism," *Journal of Chinese Buddhist Studies* 18, no. 7 (2005): 139-206.

16. The Tapani incident was one of the biggest armed uprisings, against Japanese rule in Taiwan. It took place through religious activities, so the colonial government subsequently paid more attention to popular religion and took steps to improve colonial administration in southern Taiwan.

17. 宗報 [Sōtō sect Bulletin],1908, February 1, 41-42.

18. 臺灣宗教調口報告書 [Investigation Report of Religion in Taiwan], 1 (1919): 72-74.

19. Shi Hui-Yan, Tai Wan Yu Min Rih Fo Jiao Jiao Liou Shih [The history of Buddhist exchange between Taiwan and Fujian and Japan] (Kaohsiung: Chunhui Publishing House, 2008), 37-38.

20. 南瀛佛教 [South Seas Buddhism], 1934 February, 112: 2 , 28.

Rinzai sect,[21] many of them are acclaimed Giam temples in Taiwan.

Moreover, Tōkai Gisei, a missionary sent by the *Myōshin-ji branch of Rinzai sect* of Japanese Buddhism at that time, frequently engaged in Buddhist missions with Liao Tan, a member of the Longhua Buddhist Association and manager of *Daxian Giam*大仙巖 (now known as Daxian Temple), and Master Yicun from Ensuikō (Giamshuigang) Missionary Office, together with other believers of Shōka (Changhwa) and Kagi (Chiayi).[22] He therefore entered Daxian Giam in 1925 and became a Buddhist teacher there.[23] Given the abovementioned history, Tōkai Gisei would later become the consultant of Longhua Buddhist Association.[24] On April 20, 1923, the *Myōshin-ji branch of Rinzai sect* set up an administrative office in Tainan's Kaiyuan Temple, and Tōkai Gisei was assigned there as a manager.[25] On December 26, 1923, the colonial government approved the construction of "*Longquan Temple*"龍泉寺.[26] Longquan Temple superseded *Yongquan Temple*湧泉寺, which was also called "*Heshui Giam*喝水巖." Tōkai Gisei became the abbot of Dagu Giam Yuanheng Temple打鼓岩元亨寺 in Takao (Kaohsiung) for 10 years from 1933. He was also the abbot of *Dashe Cuiping Giam*大社翠屏巖, and completed the renovation of the main hall in 1934. During the later period of Japanese rule, he had influence over the entire "*Dagang Shan sect*"大崗山派, which originated from "*Gangshan Giam*崗山巖," through his agent Monk Miaoji, and brought Dagang Shan sect under

21. Shi Hui-Yan, Tai Wan Yu Min Rih Fo Jiao Jiao Liou Shih [The history of Buddhist exchange between Taiwan and Fujian and Japan] (Kaohsiung: Chunhui Publishing House, 2008) 373.

22. 佛教口教 [The Teaching of Buddhism], 臺灣日日新報 [Taiwan Daily News] 1922, January 27.

23. 火山大祭 [The Great Volcano Festival], 臺灣日日新報 [Taiwan Daily News] 1922, April 11.

大仙巖舉行秋季 [Autumn Event at Daxian Giam], 臺灣日日新報 [Taiwan Daily News]1924, September 28.

24. 諸羅特訊, 僧往掛錫 [Special News from Chulo, Monks Staying at a Temple, 臺灣日日新報 [Taiwan Daily News] 1924, September 28.

25. Yu, Shan, "高僧略歷" [A Brief Biography of a Revered Monk], *南瀛佛教* [South Seas Buddhism], 7: 2 (1929), 77-78.

26. Jiang Cian-Tteng, *The reform and reflection of modern Buddhism in Taiwan* (Taipei: Dongda Books, 2003) 229-230.

his full control.[27] Tōkai Gisei erected numerous Buddhist temples throughout Takao (Kaohsiung) and Heitō (Pingtung), and took Taiwanese monks as his disciples, in order to achieve his strategy of "subduing Taiwanese with Taiwanese." At the later stage of Japanese rule, Tōkai Gisei had become the most powerful leader of Buddhism in southern Taiwan.

The Buddhist Association of the Republic of China during Marial Law Rule

After World War II, the Chinese Nationalist Government retreated to Taiwan. The BAROC became the "Orthodoxy" of Taiwanese Buddhism in 1953, when it held the first triple platform ordination in post-war Taiwan under martial law. Since the commencement of Japanese control, the "*Dagang Shan sect*" established by Kaiyuan Temple's monks Yimin義敏 and Yongding永定 was extremely powerful in southern Taiwan, with monasteries in all of the cities and counties of the region. However, neither of them transmitted precepts, leaving a large number of monks without precepts. In 1948, Daxian Temple raised funds for the construction of Guanyin Hall, which was completed in 1950 along with the Northern and Southern Tower of Requital and the main gate. By the next year, the two visitors halls on the north and south sides of the Mahavira Hall were also completed,[28] when the monks attempted to exploit the opportunity to transmit precepts in secrecy as the construction works were coming to an end.[29] As the monks were inexperienced, an informer leaked this attempt to BAROC. The temple, realizing the seriousness of this incident, promptly applied to join BAROC, and began to transmit precepts under its guidance. In 1949, BAROC was essentially a hastily coordinated group comprised of Chinese immigrant monks and had no legal legitimacy. Nonetheless, the authoritarian regime under martial law forced Daxian Temple to capitulate. Master Baisheng, who was responsible for directing the transmission of precepts, became the de facto foreman of BAROC and maintained influence over the *Dagang Shan sect* in the south.[30]

Under the martial law regime, BAROC was the supreme organization governing Buddhist affairs in Taiwan, and promoted Buddhism in collaboration with

27. Jiang, Cian-Tteng, "Gisei Higashiumi and the development of Buddhism in Gaoxiong during the period of Japanese rule," *Chinese Buddhist Journal* 6 (2003): 211-231.

28. Huang Wen-Po, Tu Shun-Cong, Huang Ming-Hu, *Guan Zih Ling Da Sian Sih* (Tainan: Cultural Bureau of Tainan County Government, 1995).

29. At the time, Master Kaican was concurrently the abbot of both the old and new Chaofeng Temple of Daxian Temple and Dagang Shang.

30. Jiang Cian-Tteng, *Understanding Taiwan's native Buddhism: transformation and diversified new appearances since the lifting of the martial law* (Taipei: Taiwan Commercial Press, 2012), 166.

government policies. Taiwanese Buddhism was under its jurisdiction as prescribed by the *Act of Supervising Temples*.[31] During the 1950s, some Buddhist groups advocated "Separation of Deities and Buddha" in an effort to oppose the folk religions that blended Buddhism with Taoism.[32] The national policies of "party-state system" and "anti-rebellion state-building" had rendered Buddhist monks into subservient status without their knowledge,[33] while BAROC and its affiliated associations cooperated with the government in "advancing in the aspiration of eliminating communist bandits" through activities such as a 3-day "Abbot-Managers Workshop" hosted by the local Buddhist chapter in Taipei on September 25, 1956, which aimed to educate temple abbots and staff in cooperating with anti-communist and anti-Russian policies. Besides organizing workshops on temple management and economics, seminars were conducted on "Presidential Oath of Office" and "Counterintelligence through Protecting State Secrets and Anti-Espionage," hosted by the Central Committee of Kuomintang and the commissioner of the Criminal Investigation Corps of the Taiwan Provincial Police Administration, to enhance the political awareness of the temple management and staff.[34] The Buddhist community collaborated with the government, and their ties with the party facilitated the hosting of various activities.[35]Several activities were branded with "Anti-Communism" or "Safeguarding the Nation." Furthermore, modern technology and materials were used in the classic Chinese palatial architecture as a means of declaring the sovereignty of the nationalist government and its legitimacy as a representative of China. This idea coincided with BAROC's objective of "rebuilding Buddhism in Mainland China".[36]

Choice and Coexistence

In contrast to the diversity, volatility, and intractability of folk religion, Buddhism is perhaps more stable and easier to interfere and manipulate. Buddhist

31. Jiang, Cian-Tteng, "Transformation and innovation of Chinese Buddhism in Taiwan after World War II," *Twenty-first Century* 121 (2010): 167-177.

32. Cheng, Chin-Min, *The Development and Change of Religion in Taiwan* (Taipei: Wenjin Publishing House, 2011) 134.

33. Shi Zhao-Hu, *Fo Jiao Lun Li Syue* [Buddhist Ethics] (Taipei: Fajie Publishing House, 1995), 203.

34. 臺北市縣局各寺廟主持員講習會 [Workshop for Temple Abbots in the City, County and Bureau of Taipei]. (1956, September). 臺灣佛教 [Taiwan Buddhism], 10(2), 2.

35. Jiang Cian-Teng, "The Strategies and Effects of Japanese Monk Donghai Yicheng from Linjizong Miaoxin Temple in the Japanese Era to Taiwan to Manage Buddhist Business," *Miao Lin* 9, no. 2 (1997): 23-27.

36. Chen, Ming-Yen, *The Study of Modernization of Buddhism Architecture in Taiwan* (Department of Architecture, National Cheng Kung University, 2003), 2-41.

aspects became more prominent in the *Giam* temples during the Japanese rule, some had even developed into powerful denominations, some had even developed into powerful denominations. Together with *Tōkai Gise*i's mission sent by the *Myōshin-ji branch of Rinzai sect*, Buddhist temples and *Giam* in southern Taiwan were dominated through his control over *Dagang Shan sect*. After the Second World War, BAROC acquired control of *Dagang Shan sect* through transferring precepts at Daxian Temple, and became the regime's conduit for collaboration and communication. A portion of the dual-ideological *Giam* was also highlighted and revealed. Some *Giam* temples began to select a side or move toward coexistence as a result of the two state initiatives.

Choosing the Folk Belief—Bantian Giam半天巖 in Chiayi

The genesis of Bantian Giam is connected to a Buddhist teacher who brought God statues to the temple, although its management was ultimately entrusted to the local sector. According to one account of its beginnings, three Buddhist monks each took a Guanyin statue to Taiwan with the intention of constructing a temple there. The first set up residence in Chishan Giam (Chishan Longhu Giam in Liujia, Tainan), the second in Huoshan Giam (Daxian Temple in Guanziling, Baihe), and the third in Bantian Giam. Another version is recorded in the chronicle written by Master Baisheng with reference to a monk named Nengyuan, which said, "a monk in his 70s came here in the 21st year of the reign of Emperor Kangxi of Qing, and gasped, 'This is such an excellent location for a serene temple.' He then proceeded to chop his way through the thorns and clear the land of weeds before constructing a thatched hut and inviting a Guanyin statue from Mount Putuo in the South Sea for worship. Half of the view was taken up by the sky, so he named this spot Bantian Giam (Half Sky Rock); the clouds between the mountains frequently appeared purple, so he named the temple Ziyun (Purple Cloud) Temple."

The current configuration of Bantian Giam is the result of the renovation in 1950, with two halls, two hallways, and two guarding chambers. At the center are the front Hall, left and right shelter hallways, and the main hall, with two side halls on both sides of the main hall, bell and drum towers on both sides of the Hall of front hall, and small doors connecting the side chambers on the left and right wing. In 1953,[37] the management committee of the temple hired *Master Tianyi*天乙師 from Daxian Temple as the abbot, who passed away in 1980. Conflict intensified between the local community and the succeeding abbot *Master Yichun*乙純師, which was reflected by the construction of the columbarium and the removal of heritage site

37. Master Tianyi received the precepts in 1953 at Daxian Temple during the first post-war Triple Platform Ordination.

designation for the renovation of the monastery. In 1990, local residents reorganized the congregation to elect new members of the management committee. The coordination with the monks was not successful at first, but with the help of Wu Dahai and Hong Haoran, the locals provided NT$3,000,000 to the monks for their relocation to the newly-built *Haien Temple*海恩淨寺 in Minxiong Township.

Since 1990, the local community has regained management rights over the temple, and the venue is currently used by believers of folk religions for activities attributed to the conception of incense, such as allotting of spiritual incense and praying (Figure 3). The center serves as the main venue for pilgrimage missions, where no Buddhist activities are undertaken. In the main hall, which is only accessible to the staff, there is an offering table with the deity's sculpture brought by the pilgrimage missions and another for the "allotting of spiritual incense" for the believers. The incense ash within the censer is used to stuff the sculpture for the "allocation of spiritual incense" and the "censer amalgamation" performed by pilgrimage missions, with the incense ash signifying the continuation and distribution of spiritual energy. The Lantern of Eternal Light and the Tai Shui Lantern likewise reflect the needs of the populace. The offering table, which was originally positioned in the impluvium, has been relocated to the main gate, where practitioners of spiritual formation attempt to have a supernatural experience while sitting beneath it. Both side chambers have been converted from monks' residential quarters into receiving, lodging, and dining areas for pilgrimage missions. The temple is distant from any settlement; therefore the side chambers are used to provide accommodation and catering services (Figure 4).

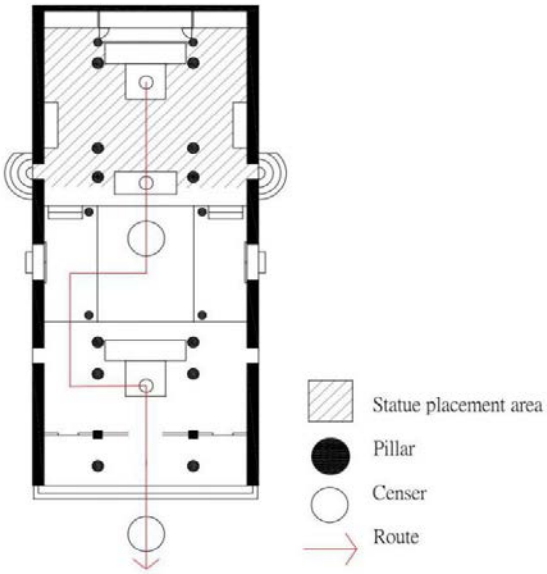

Figure 3. *The Route of the Statue Across the Censer*
Source: Author, 2021.

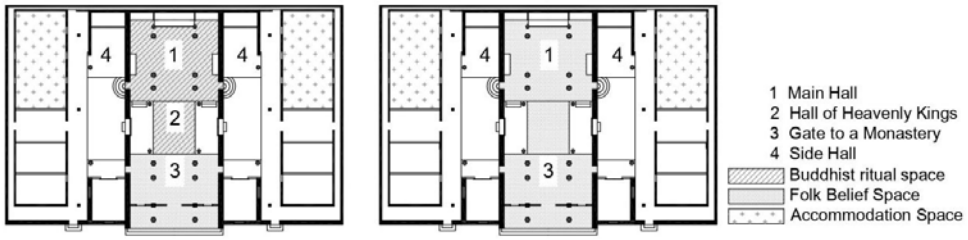

Figure 4. *The Spatial Distribution of Buddhism (left) and Folk Belief (right)*
Source: Author, 2021.

Although it retains the southern Min style of architecture since the renovation in 1947, the swallowtail roof ridges and the traditional Han style carpentry, which are important symbols of southern Min temples (Figure 5) that played a key role in the conflict caused by state intervention, are seen as unorthodox by the Taiwanese Buddhist community controlled by BAROC.[38] The monks' intention to have the heritage site designation removed in order to renovate it into a structure that adheres to "Buddhism" has begun a conflict with the local community.[39] As the monks left and the locals took control, the southern Min style of architecture has been retained.

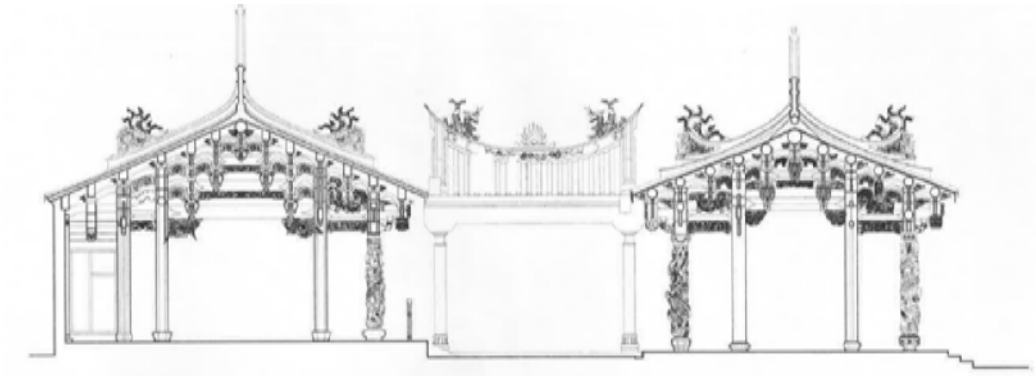

Figure 5. *Sectional View of the Central Axis Space Wooden Structure*
Source: Yan Ya-Ning 2005.

Apart from the southern Min style of architecture, the construction of the profit-seeking columbarium (Figure 6) was also a starting point of the conflict. In order to secure more income for the monastery, the columbarium was completed in

38. Chen Ming-Yen, *The Study of Modernization of Buddhism Architecture in Taiwan* (Department of Architecture, National Cheng Kung University, 2003), 2-41.

39. Yan Shan-Wen,"Cong Jia Yi Sian Ban Tian Yan Zih Yun Sih Kan Jheng Sin Fo Jiao Yu Min Jian Fo Jiao De Hu Dong Yu Yan Bian," *Taiwanese Literature* 59, no. 1 (2008): 21-48.

1981 after Yichun succeed as the abbot.[40] The locals believed that by building a columbarium in Bantian Giam, it may turn from a sprightful temple (*Giamg miao*, temples dedicated to deities and heavenly beings) to a spectral temple (*yin miao*, temples dedicated to ghosts and spirits without a proper resting place), disturbing the peace in the surrounding believers' community, and therefore greatly opposed the construction of the columbarium in the temple.[41]Consequently, the columbarium was never used, and was reconstructed into the Statue of the Rising Dragon and Guanyin (Figure 7).[42]

Figure 6. *Demolished Ossuary Tower*
Source: Yan, Shan-Wen 2008.

Figure 7. *Ossuary Tower Changed to Rising Dragon and Guanyin*
Source: Bantianyan Official Website.

Choosing the Buddhism—Cuiping Giam翠屏巖 in Kaohsiung

Cuiping Giam is now known as *Dajue Temple*大覺寺 of *Mount Guanyin* 觀音山. Legend has it that two men with the surnames Su and Lin hired a feng shui geomancer to find a suitable location for a graveyard for their ancestors. As they moved to Mount Guanyin, one of them marked his location by burying a holed-coin, while the other one did so by burying a nail. Conflict broke out on the day of

40. Yan Shan-Wen, "Cong Jia Yi Sian Ban Tian Yan Zih Yun Sih Kan Jheng Sin Fo Jiao Yu Min Jian Fo Jiao De Hu Dong Yu Yan Bian", *Taiwanese Literature* 59, no. 1 (2008): 21-48.

41. Lin Mei-Rong, "Giam-a and Guanyin Belief in Taiwan," in Yang Hui-Nan & Shi Hon-Gyin, Proceedings of the Taiwan Buddhist Symposium (Taipei: Buddhist Youth Cultural and Educational Foundation, 1996), 177-193.

42. Oral statement from Zhu Zhenyuan on March 3, 2021.

groundbreaking when they discovered that the buried nail went through the buried coin's hole. Though each of them insisted on their right to bury their ancestors there, Yang, Fang-sheng 楊芳聲, the Magistrate of Fengshan County, ruled that this land of good feng shui quality was only for Guanyin, and subsequently ordered the seizure of the land for building a temple.[43] During the era of Qing rule, the mountainous landscape was known as "Twilight of Cuiping" and was considered as one of the Eight Sceneries of Fengshan. When it became a *Giam* temple, it had jurisdiction over the joint communal union that included today's Dashe, Renwu, and Nanzih. Similar to Gangshan Giam, Cuiping Giam was not built by monks and was originally a part of the folk religion, serving as the grand temple and public temple for regional towns.

The current configuration of Cuiping Giam is the result of gradual expansion from the rear to the front. Along the central axis, Guanyin Hall, Mahavira Hall, and the Hall of Heavenly Kings are positioned from the rear to the front. The living quarters, dining hall, and kitchen are located on both sides. During the era of Japanese rule, the privately-managed Cuiping Giam was converted into the residence for the Japanese monk Tōkai Gisei. The Mahavira Hall was renovated in 1924,[44] which was located at the Guanyin Hall next to Mount Guanyin. In the next year, a sculpture of the Buddha made of white jade was bestowed to the temple by the Japanese Emperor. In 1959, *Master Longdao*隆道師, a disciple of Tōkai Gisei and *Master Yimin*義敏師, and concurrently the abbot of Longquan Temple in Kaohsiung City and Baiyun Temple in Kaohsiung County, was appointed abbot of Cuiping Giam, with *Master Ciai*慈靄師 as the prior. They raised funds to rebuild the temple, demolished the existing structure, and planned the reconstruction of the Guanyin Hall with the manager *Wu Shui-Sheng* 巫水陞. Cuiping Giam was renamed as "Dajue Temple of Mount Guanyin" in 1964, and a new Mahavira Hall was built in front of the Guanyin Hall in 1973. In 1991, there was a dispute over management rights between monks and local residents, with the monks winning the lawsuit and obtained management rights in 1994. Frontward expansion continued when *Master Shengyue* 聖岳師became the abbot in 1997, and the Hall of Heavenly Kings was built

43. Lin Mei-Rong, "Folk Buddhism as seen in Giam-a Temples of Southern Taiwan," *Thought and Words: Journal of the Humanities and Social Science* 33, no. 2 (1995): 1-40.

44. Jiang, Cian-Teng, "Gisei Higashiumi and the development of Buddhism in Gaoxiong during the period of Japanese rule," *Chinese Buddhist Journal* 16 (2003): 228.

in front of the Mahavira Hall, while the hall itself also received renovation. The site was also reconfigured to accommodate the new Arhat Hall, Vitreous Hall, Hall of Pure Land, and the statues of the twenty-four Devas (Figure 8).

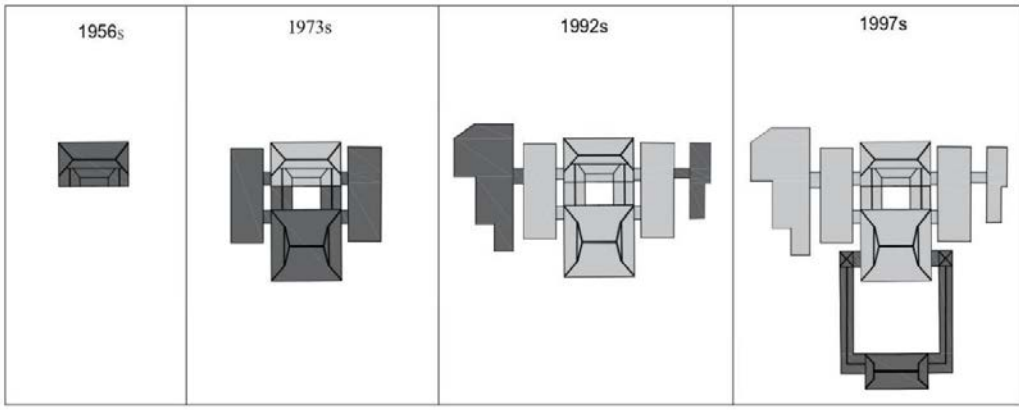

Figure 8. *Expansion from Back to Front Makes the Space More in Line with Buddhism (The Dark Part is the Added Part)*
Source: Author, 2021.

Guanyin Hall was situated in the original site. Folk religious activities were conducted there with some limitations. This may be the result of the relationship between the attributes of the *Giam* temple as a place of worshipping Guanyin and the "Lecture Hall" at the rear of the temple, which is dedicated to Guanyin, and the possible separation and concealment of folk religious activities at the rear. In 1959, Master Longdao was appointed abbot of Cuiping Giam, with Master Ciai as the prior. They raised funds for rebuilding the temple, demolishing the existing structures, and planned the reconstruction of the Guanyin Hall with the manager Wu Shuisheng.[45] A bucket of inscribed sticks (used in divination by drawing an oracle lot) and moon blocks (used in poe divination) are placed at the corner of the Guanyin Hall, but with notice signs saying "NO PLANCHETTE WRITING OR SPIRITUAL FORMATION" and "REFRAIN FROM THROWING MOON BLOCKS DURING EVENING CHANTING" (Figure 9).

45. Lin, Mei-Rong, "The tradition and changes of Taiwan's native Buddhism: .A survey of Giam-a. In National Taiwan Normal University," in *Proceedings of the 1st Taiwan Native Culture Symposium* (Taipei: Buddhist Youth Foundation, 1995), 701-722.

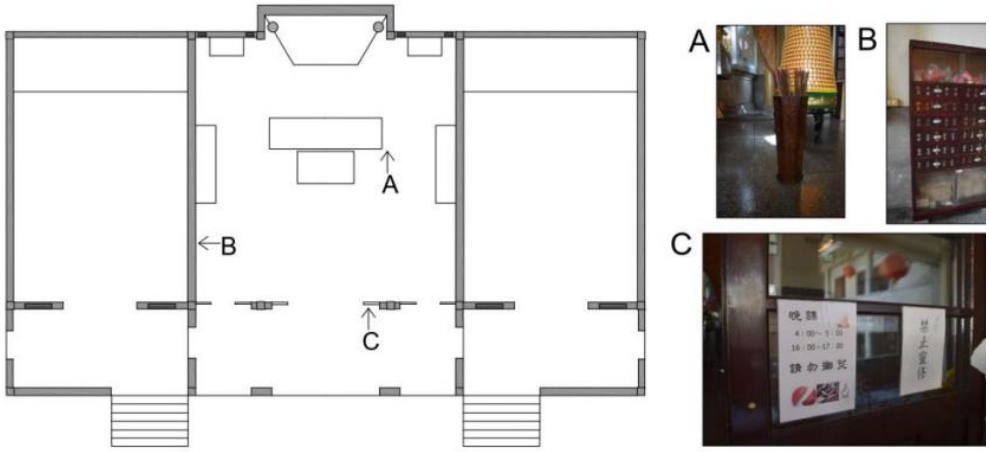

Figure 9. *The Guanyin Hall is Furnished with a Folk Belief Lottery Box (A) and a Poetry Lottery Cabinet (B), but its Folk Behavior is Still Restricted (C)*
Source: Author, 2021.

"Cuiping Giam" was renamed as "Dajue Temple of Mount Guanyin" in 1964, and a new Mahavira Hall was built in front of the Guanyin Hall in 1973, which serves as the main structure and the venue for Buddhist rituals such as morning and evening chanting. Apart emphasizing "Buddhist belief," the Mahavira Hall's adherence to BAROC's requirements was also underlined given that it is dedicated to the Buddha. As the monks obtained management rights in 1994, Master Shengyue succeeded Master Ciai as the abbot in 1997, and oversaw the expansion of the Hall of Heavenly Kings,[46] turning the overall configuration into the Hall of Heavenly Kings—Mahavira Hall—Lecture Hall that conforms with the "orthodox" Sangharama layout.[47] Today, the Mahavira Hall is an important venue for Buddhist rituals. The corridor behind the statue of Buddha serves as both the passageway to the Rear Hall and the path used in the circumambulation ritual during chanting. Such clockwise circumambulation of the statue of Buddha derived from Hindu conceptions of space and the universe (Figure 10). Meanwhile, the Hall of Heavenly Kings corresponds to the "Main Gate" as the boundary of the temple's domain.

46. Lin, Mei-Rong, "The tradition and changes of Taiwan's native Buddhism: A survey of Giam-a. In National Taiwan Normal University", Proceedings of the 1st Taiwan Native Culture Symposium (Taipei: Buddhist Youth Foundation, 1995), 701-722.

47. Huang Lan-Shiang, "Traditional Buddhist Monasteries in Taiwan during the Qing Dynasty and their Transformation under Jaese Colonialism," *Journal of Chinese Buddhist Studies* 18, no. 7 (2005): 139-206.

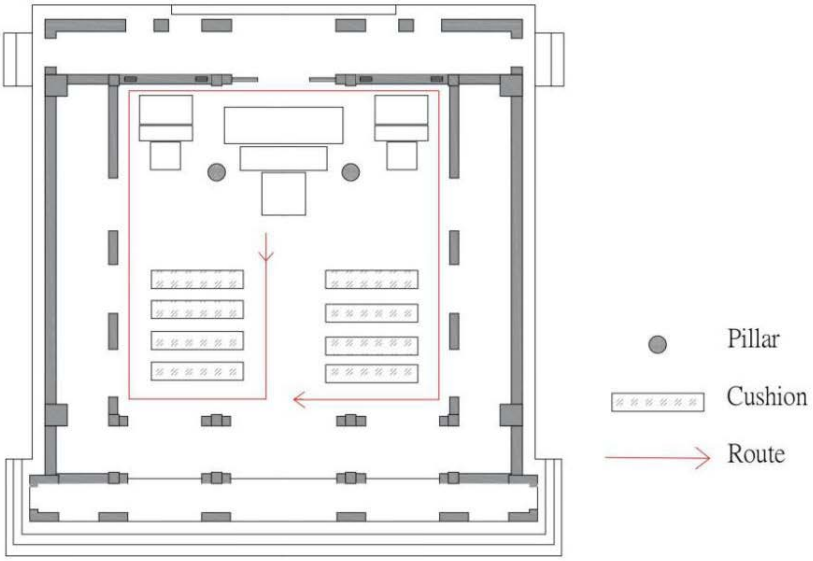

Figure 10. *The Mahavira Hall Detours Around the Buddha Statue During Religious Ceremonies*
Source: Author, 2021.

Its architectural style showed little trace of state intervention during the era of Japanese rule, with the southern Min architectural style of swallowtail roof ridges retained after the renovation in 1924 (Figure 11). The post-war renovation motivated by "Buddhization" left Cuiping Giam with simplified decorations, but folk elements were still retained on structures jointly built by local managers and monks. As the monks obtained management rights, efforts were made to enhance the Buddhist symbolism and the northern palatial style of the temple.

The northern style of palatial architecture was used to renovate the Real Hall in 1959 (Figure 12); however, its interior design still exhibited a certain folk style, such as the intentional change of ceiling design from checkered to octagonal in front of the niche to evoke a resemblance to the Chinese trigrams of Bagua, and the hanging of octagonal Yuanchendeng (Lantern of Auspicious Time) from the center of the trigrams (Figure 13). The floor was embellished with "nail in the coin's hole" decorations (Figure 14) to reflect its legendary feng shui origin. Folk style was a relatively prominent architectural feature during this period of time.

Figure 11. *Guanyin Hall in 1924*
Source: Highlights of Fengsan County.

Figure 12. *Guanyin Hall Rebuilt in 1959*
Source: Author, 2021.

Figure 13. *The Octagon on the Ceiling of Guanyin Hall Symbolizes Eight Trigram*
Source: Author, 2021.

Figure 14. *The Pattern on the Ground of Guanyin Hall Symbolizes the Legend of Feng Shui*
Source: Author, 2021.

The Buddhist symbolism of the lotus and the northern palatial style of the roof (Figure 15) better met BAROC's demand for "orthodoxy" and the government's demand for "legitimate sovereignty".[48] The secular managers and the monks were still in a cooperative relationship in 1973 during the construction of the Mahavira Hall, where it adopted a northern style of roof while retaining the style of folk temples with the two dragon pillars inside the Mahavira Hall. As the monks obtained management rights, streamers and archways shaped in lotus petals were added to the Mahavira Hall to enhance its Buddhist symbolism (Figure 16), while the northern palatial style of carpentry, which was imitated with reinforced concrete (Figure 17), was used in the expansion of the northern-styled Hall of Heavenly Kings and the left and right cloisters connecting the Mahavira Hall (Figure 18), in addition to the northern-styled roof.

48. Chen Ming-Yen, *The Study of Modernization of Buddhism Architecture in Taiwan* (Department of Architecture, National Cheng Kung University, 2003), 2-41.

Figure 15. *The Exterior of the Daxiong Palace, the Northern-Style Roof Combined with the Lotus Petal-Shaped Arch as the Main Image*
Source: Author, 2021.

Figure 16. *Lotus Sash as Main Decoration*
Source: Author, 2021.

Figure 17. *The Exterior of the Hall of Heavenly Kings, with the Northern Roof*
Source: Author, 2021.

Figure 18. *Using Reinforced Concrete to Imitate the Northern Wood Structure*
Source: Author, 2021.

Choosing Coexistence–Gangshan Giam崗山巖 in Kaohsiung

Located in Alian, Gangshan Giam was originally built by Buddhist monks, but its clerical system became unclear afterward, and developed closer relationships with the locals and the public sector. "*Revised Chronicles of Taiwan Prefecture*"續修臺灣府志 mentions: "Guanyin Pavilion of Chaofeng Rock: Located in Gangshan. Built by a monk named *Shaoguang* 紹光." At the time, Chaofeng Temple was built by a Buddhist monk, and a stone sculpture of Guanyin was enshrined there. Zeng Jing-Lai's investigation referred to this place as Chaofeng Giam, a name given by local officials in 1749 (or 1763) when they patrolled there and appropriated

funds to rebuild a hermitage into a monastery. However, the locals habitually called it Gangshan Giam.[49] Moreover, there is also the legend of the nail in a coin's hole as two families quarreled over a feng shui issue, which resulted in an adjudication of transferring the site to Guanyin. Zeng identified three of the abbots, namely Shaoguang, Duanchun, and Xinghui, while the rest of them remain unknown.[50]

The arrangement is centered on Guanyin Hall. Its rearward and sideward expansions were caused by the influx of monks and state intervention, which led to the separation of venues for folk religious and Buddhist activities as Buddhism grew more prevalent and the number of monks increased. In 1905, *Master Yimin*義敏師 traveled to Chaofeng Temple with his disciple *Master Rongding*永定師, and instructed Rongding to stay there for the renovation and expansion of the temple, where the Guanyin Hall would be renovated and the living quarters would be expanded sideward. The temple joined the *Myōshin-ji branch of Rinzai sect* in 1927 as a liaison monastery in Takao Prefecture, and the construction of a new Hall of Three Jewels behind the Guanyin Hall began next year (Figure 19). However, before the completion of the construction, the monks were forced to relocate to the foothills and build a new Chaofeng Temple there due to World War II.

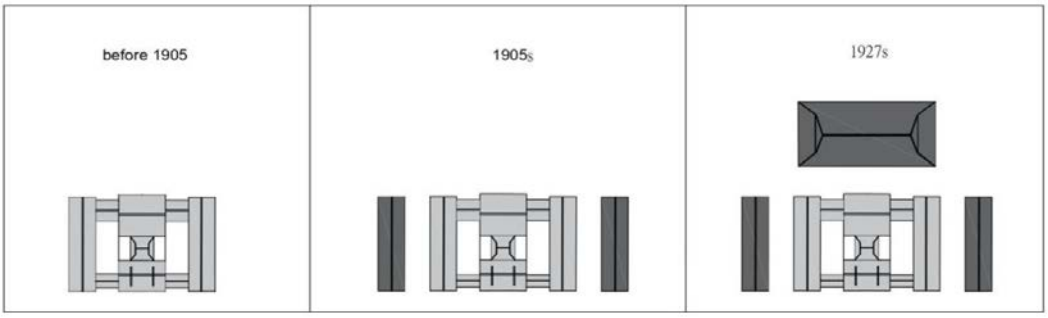

Figure 19. *Spatial Changes in the Japanese Period (the dark part is the added part)*
Source: Author, 2021.

After the World War II, *Master Kaizhao*開照師 returned to the mountain and rebuilt Chaofeng Temple in 1948. The Front Hall and the chambers on both sides were the first to be rebuilt. In 1953, Master Kaizhao received precepts in the triple platform ordination at Daxian Temple under the guidance of BAROC, which was

49 Zeng Jing-Lai. *Religion and superstition in Taiwan* (Taipei: Taiwan Religious Research Association, 1938).

50. Zeng Jing-Lai, "臺灣佛教資料─赤山の龍湖巖─大崗. 山と超峰寺" [Materials of Buddhism in Taiwan—Longhu Giam of Chishan—Da Gangshan and Chaofeng Temple], *南瀛佛教會報* [South Seas Buddhist Associations Bulletin] 16, no. 2 (1938): 24.

held for the accumulated mass of monks from *Dagang Shan sect* who had not received precepts yet.[51] Subsequently, the Hall of Three Jewels and the living quarters were rebuilt in 1956. Initially, the abbot was nominally reserved for the clergy, while the manager was nominally reserved for the laity. When *Master Fazhi*法智師 succeeded as the abbot, *Chen Bao* 陳豹, who was the manager, transferred his managerial power to Master Fazhi; the master expanded the living quarters, kitchen, and dining hall and rebuilt the Hall of Three Jewels in 1988 (Figure 20).[52]

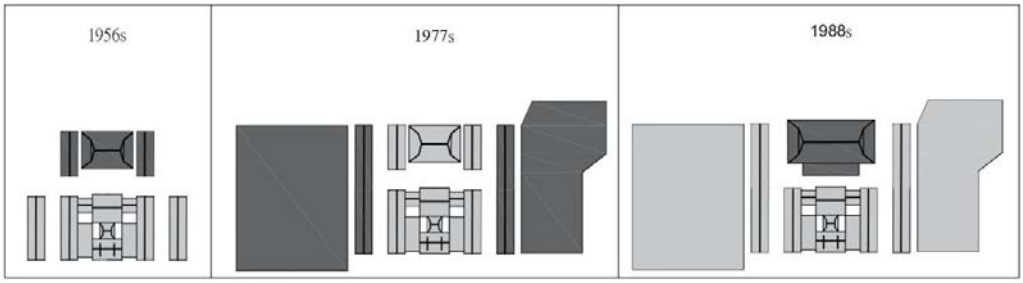

Figure 20. *Spatial Changes After World War II (The Dark Part is the Added Part)*
Source: Author, 2021.

51. Jiang Cian-Teng, *Understanding Taiwan's native Buddhism: transformation and diversified new appearances since the lifting of the martial law* (Taipei: Taiwan Commercial Press, 2012), 166.

52. Chen Yu-Chuan, *The Relationship with Folk Belief for the Dagangshan Chao-feng Temple through the Perspective of Folk Buddhism* (Institute of Religion and Humanities, Tzu Chi University, 2010), 37-40.

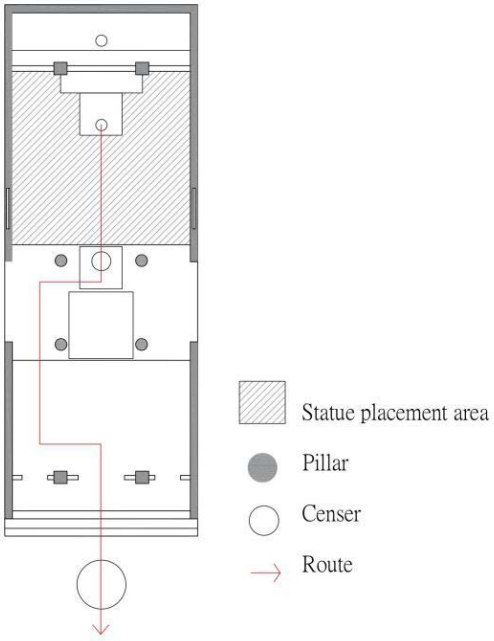

Figure 21. *The Route of the Statue Across the Censer*
Source: Author, 2021.

Guanyin Hall has always been the location for incense-related folk religious activities, such as the distribution of spiritual incense and prayers. In accordance with the "Separation of Deities and Buddha" advocated by some Buddhist groups in the 1950s, pilgrimage missions cannot conduct their activities beyond Guanyin Hall. This reflects the separation of folk religion and Buddhism caused by the growing dominance of Buddhism after state intervention, and conforms to the "Guanyin Hall Rule".[53] The deity sculptures brought by pilgrimage missions are placed in the main space, and removing the sculpture from the temple requires passing across the top of censer on the table (Figure 21). Only the monks or the abbot of the temple are allowed to insert joss sticks into the inner censer of the niche. The incense ash is purposely collected for pilgrimage missions as a means of sharing the spiritual energy of Chaofeng Temple, or as "lu dan" (incense ash perceived to have medicinal properties) for the believers. Folk religious activities that require "throwing of moon blocks"[54] or "drawing of oracle lots" are also carried out inside the Guanyin Hall.

As the monks began to settle in Chaofeng Temple in 1915, a notion emerged that considered a "Mahavira Hall" necessary in a "Buddhist temple".[55] After joining the

53. Cheng, Chin-Min, *The Development and Change of Religion in Taiwan* (Taipei: Wenjin Publishing House, 2011), 134.

54. Oral statement from a member of staff receiving pilgrimage missions on September 13, 2019.

55. Gang Shan Jyun Yi Suo, *Gang Shan Jyun Yao Lan* [Overview of Okayama County] (Taipei: Chengwen Publishing, 1923).

Myōshin-ji branch of Rinzai sect, the construction of the Mahavira Hall began the next year (1928),[56] which symbolized and asserted the conversion of Chaofeng Temple from the folk religious Gangshan Giam to a Buddhist monastery.[57] However, the monks were forced to leave the mountain due to the Second World War.

After the war, the Hall of Three Jewels was rebuilt in 1956, and Master Baisheng of BAROC hosted the transmission of precepts ceremony there, which was seen as the continuation of that one held at Daxian Temple in 1953, and established the dominant status of Chaofeng Temple in the Buddhist community in southern Taiwan. Although this ceremony was considered a resurgence of the powerful *Dagang Shan sect* from the era of Japanese rule, it was also seen as a departure from the local community.[58] The current layout of the Hall of Three Jewels is the product of the enlargement work in 1988, which provided monks with the necessary space to conduct daily chanting and monastic rites and services. Behind the statue of the Buddha is a passageway used for ceremonial circumambulation (Figure 22).

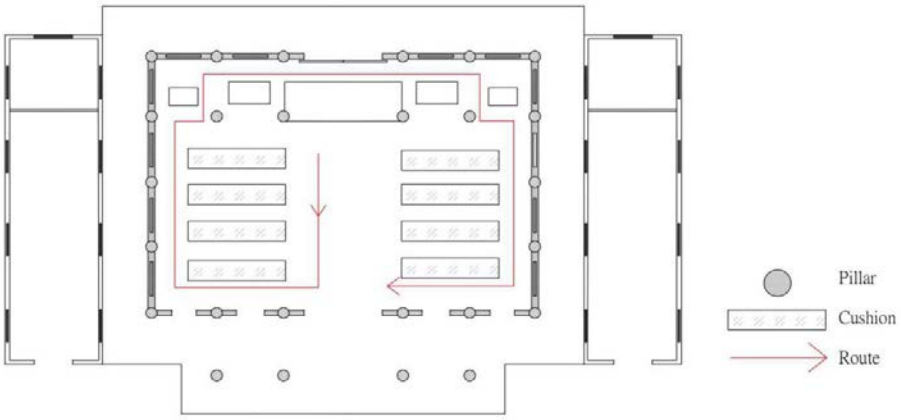

Figure 22. *The Mahavira Hall Detours around the Buddha Statue During Religious Ceremonies*

Source: Author, 2021.

Guanyin Hall embraced the southern Min architectural style, with roof ridges resembling folk religious structures prior to governmental interference. From the times of Japanese rule to the post-war era, the increasing magnificence of Guanyin

56. 超峰寺之建築 [The Architecture of Chaofeng Temple]. (1928, October 4). 臺灣日日新報 [Taiwan Daily News] (4th ed.).

57. Chen Yu-Chuan, *The Relationship with Folk Belief for the Dagangshan Chao-feng Temple through the Perspective of Folk Buddhism* (Institute of Religion and Humanities, Tzu Chi University, 2010), 29-36.

58. Chen, Kuang-Jung, *The Development and the Change of Lifestyle of Alien Village* (Native Culture Research Institute, National Tainan University, 2003), 37.

Hall (Figures 23, 24) represented the growing significance of its folk religious attributes. The hall was constructed using a method of carpentry known as "bidanying" (pillar-bearing wall), in which the load-bearing walls support the pillars and the beams before the roof is constructed. Octagonal "yuanchendeng" (Lanterns of Auspicious Time) are hung from above, and specialists known as "xiangdengshi" (lantern keepers) are employed to attend to the lanterns and keep them indefinitely illuminated by constant refueling (Figure 25). There is a saying among fishermen in Kaohsiung and Pingtung that the Guanyin Hall's lanterns, which are located on the high Gangshan Giam, guided the navigation of fishing vessels in the times before lighthouses. There is a modest octagonal tracery at the praying pavilion (Figure 26). The surrounding walls are adorned with clay sculptures depicting traditional themes, such as the Dragon and Tiger Wall and The Heaven-Moving Filial Piety. The wood carvings in the niche depicting fortunate flowers and birds exemplify the majesty of southern Min architecture.

Figure 23. *Guanyin Hall in 1922*
Source: Chen, Yu- Juan, 2005.

Figure 24. *The Current State of Guanyin Hall, the Roof has Become More Ornate*
Source: Author, 2021.

Figure 25. *Wooden Carved Shrine with Bright Lamps*

Figure 26. *Octagonal Wood Carving Ceiling*
Source: Author, 2021.

The Hall of Three Jewels exhibits three architectural styles, viz. the southern Min style during the era of Japanese rule (Figure 27), the simplified southern Min style of the swallowtail roof ridges during the early post-war era (Figure 28), and the northern palatial style used in recent renovations (Figure 29). The shifting styles reflect the simplification of secular decorations as the Buddhist attributes became prominent, as well as the trend of Buddhist monasterial architecture under the influence of BAROC and the political notion of "legitimate sovereignty." The first design of the temple was made during Japanese rule, and was never completed as the monks were forced to leave the mountain due to World War II; the second design was completed in 1958, where the swallowtail and upward- curving roof ridges were simplified while the niche and dragon pillars inside were resplendently decorated (Figure 30); the final design as of now is the result of renovation in 1988, when the monks obtained full management rights. The main structure is built with reinforced concrete, where efforts were made to imitate northern palatial architecture. In contrast to Guanyin Hall, the ceiling is modestly ornamented with a timber coffered ceiling and a motif relating to the Buddha's life (Figure 31). In the back of the Hall of Three Jewels, the swallowtail roof ridges transition to a northern style roof, signifying the building's evolution from a symbol of "folk religion" to a structure consistent with "orthodox Buddhism".[59]

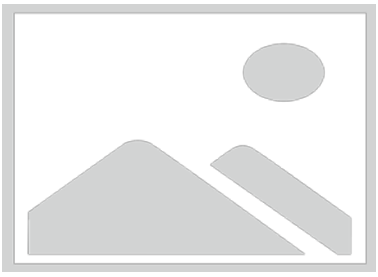

Figure 27. *The First Generation of Mahavira Hall*
Source: Dagangshan Chaofeng Temple

Figure 28. *The Second Generation of Mahavira Hall*
Source: Dagangshan Chaofeng Temple

Figure 29. *The Third Generation of Mahavira Hall*
Source: Author, 2021

59. Chen, Yu-Chuan, *The Relationship with Folk Belief for the Dagangshan Chao-feng Temple through the Perspective of Folk Buddhism* (Institute of Religion and Humanities, Tzu Chi University, 2010).

Figure 30. *The Interior Landscape of the Second-Generation Mahavira Hall, with Bright Lights and Stone-Carved Dragon Columns on Both Sides*
Source: Dagangshan Chaofeng Temple.

Figure 31. *The Top of the Third-Generation Three Treasures Hall is Decorated with a Latticed Ceiling, Surrounded by the Story of Sakyamuni Buddha*
Source: Author, 2021.

Conclusion

This essay analyzed the configurational and architectural transformation of Giam temples facilitated by two stages of state intervention, the era of Japanese rule and the post-war era, through their legendary origins, their spatial changes and the styles and details of how the buildings were used, and with three examples illustrated the adjustments of aligning to folk religion or Buddhism, as well as the result of the attempt to adapt both religious attributes. Registration of religious institutions began from the era of Japanese rule, and was turned into more thorough investigation targeting local religions after the Tapani Incident, where the dualistic Giam temples were subjected to registration policy that kept their attributes and management in records to ensure their cooperation. Simultaneously, the government gained control over the religions in Taiwan through such investigations, while the intervention from the Buddhist sects in Japan made the Buddhist attribute of Giam temples more prominent. This continued after World War II, where Giam temples were considered Buddhist and formed connections with BAROC, turning them into venues that exerted the will of the government under the martial law regime.

This essay arrives at the following findings: folk religion-oriented Giam temples placed greater emphasis on the transmission of spiritual power through incense, smoke, and censers, whereas Buddhism-oriented Giam temples focused more on the embodiment of cosmology and Buddhist sutras. Furthermore, some Giam temples might even attempt to enable the coexistence of the two religious orientations in the spaces and rituals. The overall results reflected the choice between Buddhism and folk religion after the rivalry between them, or the compromised coexistence between the two religions through spatial division. Bantian Giam restored its folk religious nature as a result of its handover to the

management to the local community due to disputes between the monks and the locals regarding the construction of the columbarium and the attempt of demolishing the original structure; Cuiping Giam assimilated the Guanyin- worshipping "Giam-a" into a Buddhist "Lecture Hall," which is also dedicated to Guanyin in accordance to the Sangharama layout of Buddhist monasteries, and further conformed to orthodox Buddhist monasterial layouts by forward expansion; and Gangshan Giam brought coexistence in both religions by separating the venues for different uses. The Guanyin Hall at the front, which retained the swallowtail roof ridges of the southern Min architectural style, is used for offering incense and drawing oracle lots, while the venue at the back adopted the northern palatial style, and is used for Buddhist rituals and ceremonies.

As shown in the development of the three examples, the origins of Giam temples in Taiwan were often closely linked to their surrounding terrain and mountain ranges. Details such as feng shui legends and the stone sculpture of Guanyin highlighted the "specialness and sanctity" of these places, and their naming was also closely related to the mountains, such as Gangshan Giam, Cuiping Giam, and Bantian Giam, which were all named after the mountains surrounding them. Even when Buddhism was introduced in these temples, their names retained the theme of mountains. For example, Gangshan Giam was renamed Chaofeng Temple of Mount Dagang, while Cuiping Giam was renamed Dajue Temple of Mount Guanyin.

Three cases reflect a pattern of confrontation between institutional religion and folk belief, possibly related to the properties of mountains as sacred symbols across regions and interracial. Mountain ranges, as an important and sacred phenomenon across ethnic groups, geographic regions, and religions, can bring together local and foreign religions, where attributes of different religions may form connections in the conceptions of the world and the universe. Apart from embodying the center of the world and the universe, the towering mountain ranges, with exotic terrain and rocks that are easily turned into canonized objects, are worshipped and even deified in certain religious beliefs. However, because mountain ranges unite religions with different characteristics, they are easily impacted when modern governments and policies intervene in religious affairs, and may be compelled to align themselves with one of the many religious characteristics, or find ways to allow for the coexistence of the various characteristics. This phenomenon is represented in the use of space and the style of architecture, which are frequently modified in reaction to the governing institution to create a balance of influence among local cliques. In the follow-up, it may be possible to extend the issue on the religious buildings related to the mountain and the impact of the intervention of state power.

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Athens Journal of Architecture - Volume 10, Issue 1, January 2024 – Pages 85-126
(received: 1 May 2022, received in revised form: 9 July 2023, accepted: 4 October 2023)

Building Environments for Female Sex Trafficking Victims: A Parametric Design Approach

By Foteini Papadopoulou[*], *Silvio Carta*[±] *& Ian Wyn Owen*[°]

This paper presents findings on the use of computational design techniques to analyse and develop a building environment based on a set of defined design principles. In this study, we explored and established the design principles of a building environment for female victims of sex trafficking that contribute to the overall recovery and reintegration of these women into society. Additionally, we examined and evaluated the use of parametric design as a computational tool to support the development of a model for designing these building environments. We address this issue by creating a set of guidelines based on data research and literature review and testing data-driven techniques, including generative design and models for self-organising floor plans. The paper explores the benefits as well as the potential disadvantages of such design approaches by comparing them to this set of desired guidelines. Finally, we present preliminary findings from this analysis and suggest further research directions.

Introduction

As an urban typology, a building environment for sex trafficking victims is not clearly defined, nor sufficiently studied. They are usually considered a subset of healthcare settings, sheltering or temporary accommodations. Additionally, due to the severe conditions imposed on sex trafficking victims, which can last anywhere from a few days to several years, each survivor requires greater emotional support and care. If the victims are not treated appropriately, they might develop a variety of mental disorders[1]. As such, it's crucial to ensure that the design of the accommodation in which they will be housed supports their recovery and healing process, while also supporting their needs.

This research has two aims:

1. to analyse how the built environment can play a critical role in the recovery process of female victims of sex trafficking. This study examined how a building environment, with its design and taking into account all the relevant parameters and stakeholders, may help these women to recover and set the groundwork for their independent return to society.

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1. Idris, I. (2017) *Interventions to support victims of modern slavery* [Online] December 2017. Available at: https://assets.publishing.service.gov.uk/media/5a5f213de5274a443e00370e/256-Interventions-to-support-victims-of-modern-slavery.pdf [Accessed: 18th December 2019]

2. to explore and examine the potential value of parametric design as a computational tool for developing the spatial configurations of a building environment for female sex trafficking victims based on specific parameters that will allow a deeper exploration of design options.

This study proposes a novel approach to the design of building environments based on the physiological and psychological needs of sex trafficking victims and the way to facilitate their access to a range of services that will contribute to their empowerment.

In this research, a parametric design method was used to develop a building environment for female victims of sex trafficking. Using a computational model that could lead to deeper design exploration, this research aims to design the built environment based on specific design principles that can play a critical role in the recovery process of these women. By analysing their unique design and considering relevant parameters and stakeholders, this study investigated how the building environment could help these women recover and set the groundwork for their independent return to society. The process involved the exploration and critical examination of two algorithms, using as parameters the design principles for developing a building environment for female victims of sex trafficking: the Squarified Treemap and the Magnetising Floor plan Generator. The software used in this project was Rhinoceros for the modelling and Grasshopper for the visual coding.

Literature Review

Human Trafficking

Human trafficking is a 'multi-billion-dollar form of international organised crime, constituting modern-day slavery'.[2] An average of 150 billion dollars is produced each year by exploiting vulnerable people's bodies and forcing them to work against their will. There are various types of human trafficking: sex trafficking, forced labour, bonded labour, involuntary domestic servitude and child soldiers.[3]

Globally, vulnerable people are abused and exploited for their labour and bodies without consent and the number of trafficked people today is estimated at around 40.3 million, the highest in history; an estimated 5.4 out of every 1,000 people are enslaved globally: 71% are women, 29% are men, and 25% are children.[4] The bibliography presents various studies[5] [6] [7] for domestic abuse

2. Interpol (2019). *Human trafficking*. [Online] Available at: https://www.interpol.int/Crimes/Human-trafficking [Accessed: 3rd June 2020]

3. A21 (2022). *Human Trafficking.* [Online] Available at: https://www.a21.org/content/human-trafficking/gqe0rc [Accessed: 21st March 2022]

4. A21 (2022). *Human Trafficking.* [Online] Available at: https://www.a21.org/content/human-trafficking/gqe0rc [Accessed: 21st March 2022]

5. BC Housing (2017). *Shelter Design Guidelines*, [Online] Available at: https://www.bchousing.org/publications/Shelter-Design-Guidelines.pdf [Accessed:15 October 2020]

victims and homelessness guidelines but, significantly, there are no specific design instructions for the accommodation of victims of sex trafficking.
A person's vulnerability could occur due to various factors:[8]

- Lack of ability to protect oneself
- Lack of social or family support
- Social exclusion
- Abuse history
- Immigration or refugee status
- Dysfunctional family
- Globalisation
- Political disruption
- War
- Poverty conditions

The reduction of the victims' defensive mechanisms due to these factors is the reason that makes people more vulnerable to trafficking and exploitation. Furthermore, unless the trauma caused by these traumatic events, as well as the factors that contributed to the victims' vulnerability, are addressed, a trafficked victim's chances of being exploited and victimised again are substantial. Re-victimisation can only be avoided by providing specialised support and empowering victims, which will lead to their recuperation and independence.[9]

Various organisations around the world provide support to victims of human trafficking globally. In the UK in particular, the Adult Human Trafficking Victim Care and Coordination contract, funded by the Home Office and the Ministry of Justice, had been assigned to the Salvation Army in England and Wales since July 2011; in January 2021, it was renewed and extended as The Modern Slavery Victim Care and Coordination Contract (MSVCC)[10]. In collaboration with several subcontractors, The Salvation Army supervises the management and oversight of

6. Prestwood, LE (2010). *Architectural design factors of domestic violence shelters that affect outcomes for female domestic violence victims: a naturalistic inquiry to establish grounded theory for future research.* A thesis Submitted to the Office of Graduate Studies of Texas A&M University in partial fulfillment of the requirements for the Degree of Doctor of Philosophy. Texas, US: Texas A&M University. Available from: https://core.ac.uk/download/pdf/147140403.pdf [Accessed: 3rd July 2020]

7. Grieder, M.A. & Chanmugam, A. (2013). Applying Environmental Psychology in the Design of Domestic Violence Shelters. *Journal of Aggression, Maltreatment &*

Trauma, [Online] 22(4). pp.365-378. Available from: DOI: 10.1080/10926771.2013.775984 [Accessed: 18th October 2019]

8. American Psychological Association (2017) *Facts About Trafficking of Women and Girls,* [Online] Available at: https://www.apa.org/ advocacy/interpersonal-violence/trafficking-women-girls [Accessed: 11th June 2020]

9. A21 (2022). *Human Trafficking.* [Online] Available at: https://www.a21.org/content/human-trafficking/gqe0rc [Accessed: 21st March 2022]

10. The Salvation Army (2022). *New 2021 Victim Care Contract.* [Online] Available at: https://www.salvationarmy.org.uk/modern-slavery/new-victim-care-contract [Accessed: 21st March 2022]

the assistance measures provided to adult victims of human trafficking, evaluating each case independently to provide appropriate support.

Individuals who have been identified as potential victims by the National Referral Mechanism (NRM), a process for identifying potential victims of trafficking, are eligible to have a minimum of forty-five days of support in England, Wales and Northern Ireland (ninety days in Scotland) and can have access to:

- Safe accommodation
- Practical help and advice
- Interpretation and translation services
- Financial support
- Healthcare to meet physical, emotional and mental health needs
- Specialist legal advice
- Education for school-aged dependent children
- Transport to important appointments
- Future-planning support[10] [11]

These services are designed to address the emergency, short-term and long-term needs of victims that have been identified by several studies[12] [13] [14] including safety, food, clothing, medical treatment, translation, counselling, education etc. (Table 1).

The aid provided by NRM is essential for the victims' rehabilitation and integration into society; ultimately, it will enable survivors to overcome their traumatic experiences and move on to the next phase of their recovery. This may include relocating to private residences or subsidised accommodation, as well as returning to their country of origin.[15] [16] [17] [18] [19] In contrast, victims who do not receive support are more likely to be exploited and trafficked again.[14]

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11. Hibiscus Initiatives (2020). *Closed doors* [Online]. Available at: https://hibiscusinitiatives.org.uk/wp-content/uploads/2020/12/2020_11_24-HI_Closed-Doors_Main-Report_FINAL_DIGITAL.pdf [Accessed: 23rd March 2022]

12. Clawson H. J. & Dutch, N. (2008). *Addressing the needs of victims of human trafficking: challenges, barriers, and promising practices.* [Online] July 2008. Available at: https://aspe.hhs.gov/report/addressing-needs-victims-human-trafficking-challenges-barriers-and-promising-practices [Accessed: 18th December 2019]

13. Purple Teardrop Campaign (2012). *Support Safehouses for Trafficking Victims*. [Online] Available at: http://www.purpleteardrop.org.uk/ what-we-do/support-safehouses-for-trafficking-victims/ [Accessed: 18th December 2019]

14. Idris, I. (2017) *Interventions to support victims of modern slavery* [Online] December 2017. Available at: https://assets.publishing.service.gov.uk/media/5a5f213de5274a443e00370e/256-Interventions-to-support-victims-of-modern-slavery.pdf [Accessed: 18th December 2019]

15. UN Human Rights Committee (2020). *Joint civil society report on trafficking and modern slavery in the UK to the UN Human Rights Committee*, [Online] Available at: https://www.antislavery.org/wp-content/uploads/2020/01/Submission-HRC-modern-slavery-in-UK-Jan20.pdf [Accessed: 12th June 2020]

16. UK. Department of Justice (2013) *Human Trafficking Know Your Rights.* Available from: https://www.justice-ni.gov.uk/sites/default/files/publications/doj/ht-leaflet-english.pdf [Accessed: 12th June 2020]

Table 1. *Needs of Victims of Human Trafficking*

	International		Domestic Minors
	Adults	Minors	
Emergency			
Safety	•	•	•
Housing	•	•	•
Food / Clothing	•	•	•
Translation	•	•	
Legal guardianship		•	•
Short / long term			
Transitional housing	•		•
Long-term housing	•		•
Permanency placement		•	
Legal assistance	•	•	•
Advocacy			
Translation	•	•	•
Medical care	•	•	•
Mental health / Counselling	•	•	•
Substance abuse treatment			•*
Transportation	•		•
Life skills	•	•	•
Education	•	•	•
Financial assistance / management	•		•
Job training / Employment	•	•	•
Childcare	•	•	•
Reunification / Repatriation	•	•	•

*While substance abuse treatment may be a need for international victims, it was only identified as a need for domestic minor victims

Source: Clawson and Dutch (2008).

Key Statistics

According to the "Year eight report on The Salvation Army's Victim Care and Coordination Contract", The Salvation Army provided support to survivors of modern slavery in ninety-nine different countries from July 2018 to June 2019. Approximately 2,251 potential victims accessed the service to receive support (a 21% increase from the previous year). A total of 1,247 identify as women, 999 identify as men, and 5 identify as transgender. There were 881 cases of trafficking for sexual exploitation recorded (Table 2). About one-quarter of the survivors assisted were Albanians, with 95% being female victims of sex trafficking.

17. Human Trafficking Foundation (2020). *Improving Victim Support.* [Online] Available at: https://www.humantraffickingfoundation.org/ policy [Accessed: 12th June 2020]

18. The Salvation Army (2019b). *62% Rise In Human Trafficking Victims Seeking Support,* [Online] Available at: https://www.salvationarmy. org.uk/news/62-rise-human-trafficking-victims-seeking-support [Accessed: 12th June 2020]

19. GOV.UK (2020). *National referral mechanism guidance: adult (England and Wales).* [Online] Available at: https://www.gov.uk/government/publications/human-trafficking-victims-referral-and-assessment-forms/guidance-on-the-national-referral-mechanism-for-potential-adult-victims-of-modern-slavery-england-and-wales [Accessed: 19th January 2021]

Among the 2,251 potential victims who accessed support, 46% came from London. The average number of days spent in safe houses was 159[20] (Table 3).

Table 2. *Exploitation Types by Gender*

Exploitation type	Female	Male	Trangender	Total
Domestic Servitude	227	47	0	274
Labour	150	922	0	1072
Organ removal	1	0	0	1
Sexual	855	21	5	881
To be confirmed	14	9	0	23
Total	1247	999	5	2251

Source: The Salvation Army (2019a).

Table 3. *Length of Time in Support*

	Accomodation in safe house	Outreach support
Average (mean) days in service	159	508

Source: The Salvation Army (2019a).

Female Sex Trafficking

The focus of this research is on the accommodation provided to female victims of sex trafficking. For victims of trafficking and exploitation, shelter is crucial since homelessness and unsafe housing can lead to re-exploitation and re-victimization by both new and existing offenders. Female sex trafficking is a global phenomenon that occurs in every country, 'either as a source, transit or destination area'.[21] Women from developing countries or dysfunctional groups in developed countries are captured by an organised network of traffickers, misled by the hope of a better life. Isolated by their traffickers in a strange environment they are subjected to constant sexual exploitation, terrorism and inhumane conditions[21]. During their captivity, these women experience sexual and physical violence, drug use and malnutrition.[22]

20. The Salvation Army (2019a). *Supporting victims of modern slavery*, [Online] Available at: https://www.salvationarmy.org.uk/sites/default/files/resources/2020-03/FINAL%20Modern%20Day%20Slavery%20Report%202019%20Colour.pdf [Accessed: 10th June 2020]

21. Interpol (2022). *Types of human trafficking*. [Online] Available at: https://www.interpol.int/Crimes/Human-trafficking/Types-of-human-trafficking [Accessed: 21st March 2022]

22. A21 (2022). *Human Trafficking.* [Online] Available at: https://www.a21.org/content/human-trafficking/gqe0rc [Accessed: 21st March 2022]

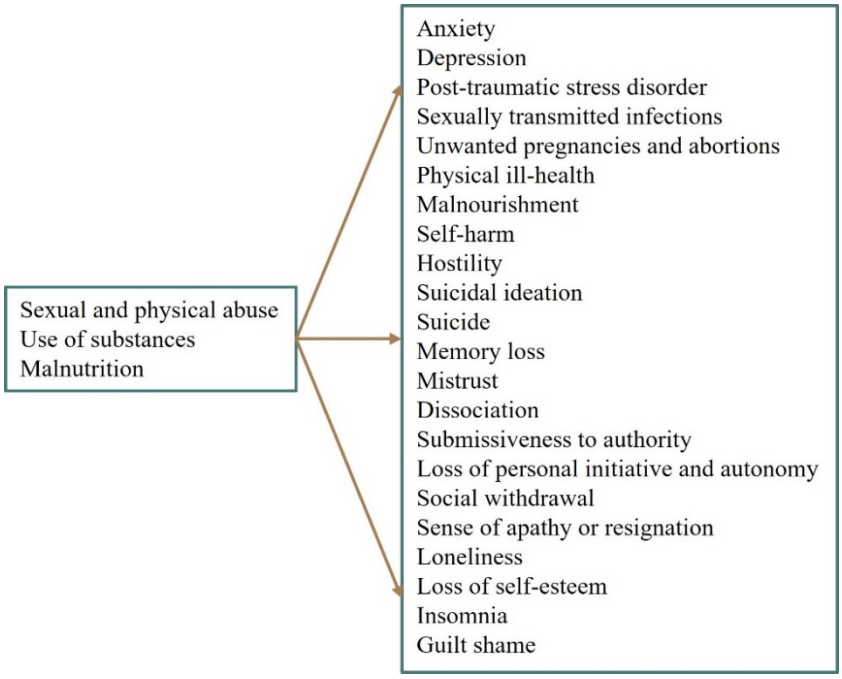

Figure 1. *Mental Health Issues of Victims of Sex Trafficking*
Source: Papadopoulou 2021.
Data: A21(2022), Idris (2017) and Hodge (2014)

Domestic homicide, domestic abuse, sexual assault, child abuse, female genital mutilation (FGM), forced marriage, and harassment in work and public life are all examples of violence against women.[23] They are, however, all distinct from the crime of sex trafficking and highlight the fact that victims of sex trafficking face some of the most complex mental health challenges of any criminal victim.[24] However, there are similarities in the emotional impact on women and the mental disorders that result from both sorts of crimes. For example, between 2017 to 2020, an estimated 63 per cent of women aged 16 and above who were victims of relevant crimes such as assault and rape in all forms experienced mental or emotional issues, and 10% attempted suicide.[25] These mental issues are much more significant in victims of sex trafficking; according to the University of

23. Office for National Statistics (2022). *The lasting impact of violence against women and girls* [Online] November 2021. Available at: https://www.ons.gov.uk/peoplepopulationandcommunity/crimeandjustice/articles/thelastingimpactofviolenceagainstwomenandgirls/2021-11-24#:~:text=Violence%20against%20women%20and%20girls%20(VAWG)%20is%20an%20umbrella%20term,in%20work%20and%20public%20life [Accessed: 22nd March 2022]

24. Kaylor, L. (2015). Psychological impact of human trafficking and sex slavery worldwide: Empowerment and intervention. *Intern from John Jay College of Criminal Justice New York, NY*. [Online] Available at: https://scholar.googleusercontent.com/scholar?q=cache:KOVx4XHvtSAJ:scholar.google.com/+Kaylor,+2015&hl=el&as_sdt=0,5 [Accessed: 21st March 2022]

25. Office for National Statistics (2022). *The lasting impact of violence against women and girls* [Online] November 2021. Available at: https://www.ons.gov.uk/peoplepopulationandcommunity/crimeandjustice/articles/thelastingimpactofviolenceagainstwomenandgirls/2021-11-24#:~:text=Violence%20against%20women%20and%20girls%20(VAWG)%20is%20an%20umbrella%20term,in%20work%20and%20public%20life [Accessed: 22nd March 2022]

Liverpool, sex trafficking victims require greater emotional treatment in the first evaluation stage than victims of other types of trafficking.[26] Moreover, the variety of mental disorders individuals experience as a result of the traumatic situations they were exposed to, such as anxiety, depression, self-harm, social disengagement, and so on (Figure 1), could persist for a long time. It is, therefore, essential to ensure that these individuals are placed in a building environment that will address their practical needs as well as facilitate their rehabilitation.

What is needed

Current solutions for building environments for sex trafficking victims primarily focus on providing survivors with safe accommodation.[27] These houses serve as places where residents' fundamental physiological needs are met and where they can access a variety of services to address those needs. However, three gaps have been identified in this study:

- Gap in the existing literature
  The specific gap resides in the lack of relevant literature, bibliography, and specialized study on the interior architecture and design of a building environment for female sex trafficking victims.
- Gap in the interior design standards and guidelines
  This specific gap relates to the lack of interior design guidelines and standards that should be adhered to ensure the effective development of a building environment for female sex trafficking victims.
- Gap in the usage of machine learning
  The specific gap focuses on the lack of application of advanced analytical and design models for such environments. Such architectural studies could reflect the specific needs of sex-trafficked women towards their recovery and gradual reintegration into society.

Research Methodology

This project aims to investigate and identify the design principles of a building environment for female sex trafficking victims that contribute to their overall healing and reintegration into society. Furthermore, it also aims to investigate how parametric design may be utilised to develop a model of a therapeutic environment that can aid in the healing process of its patients. By

26. Idris, I. (2017) *Interventions to support victims of modern slavery* [Online] December 2017. Available at: https://assets.publishing.service.gov.uk/media/5a5f213de5274a443e00370e/256-Interventions-to-support-victims-of-modern-slavery.pdf [Accessed: 18th December 2019]

27. Human Trafficking Foundation (2018). *The Slavery and Trafficking Survivor Care Standards* [Online] October 2018. Available at: https://www.antislaverycommissioner.co.uk/media/1235/slavery-and-trafficking-survivor-care-standards.pdf [Accessed: 21st March 2022]

analysing primary and secondary data, we identified the key needs of the victims and the services that they should receive to facilitate their recovery. Through the use of interviews (analysed qualitatively) and secondary research data, the design principles of a building environment for female sex trafficking victims were established. These were set as parameters to specific data-driven techniques, including generative design and models for self-organising floor plans that were critically examined. Following this critical examination, the most appropriate technique was selected according to the research criteria. Several spatial solutions were generated and the optimal one according to the design principles and requirements was selected. This process led to the development of the Parametric Development of Restoration (PDR) model (Figure 2).

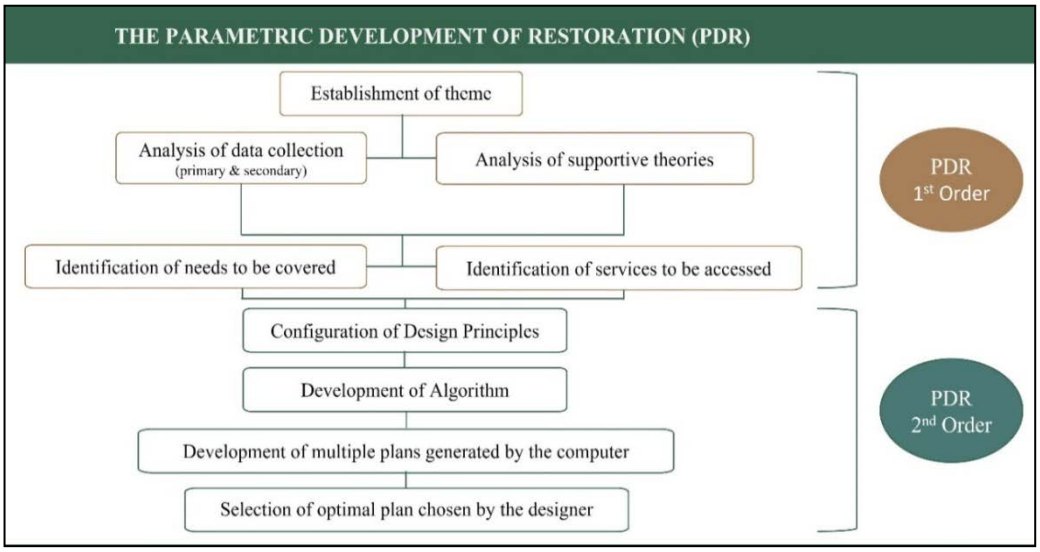

Figure 2. *The Parametric Development of Restoration*
Source: Papadopoulou 2021.

Elaboration of Design Criteria

This study is focused on two main objectives:

- Objective 1: To describe how the design of the building environment will meet the physiological and psychological needs of the women, contributing positively to their healing.
- Objective 2: To examine how the design of the building environment can facilitate the access of women to a range of services that will allow them to take control of their lives.

Objective 1

Numerous studies[28] [29] [30] [31] [32] [33] [34] have been conducted over the years to investigate the relationship between the characteristics of a built environment and the well-being of its residents; from the Classical Greece era to the present day, the perception of the built environment's impact on human well-being as well as the healing process of patients has been extensively researched.

In his Theory of Supportive Design, Ulrich (2001)[35] discusses the impact of stress on patients, and how building environments that are designed to relieve stress are beneficial to patients' healing and recuperation. Three evidence-based design guidelines are identified in his analysis as having a positive impact on patients' stress and healing outcomes in therapeutic settings. These are:

1. Foster a Sense of Control

Control, or an individual's ability to influence environmental conditions, is directly related to stress and health outcomes. In a therapeutic setting, a lack of privacy, excessive noise, poor lighting, or spatial disorientation can all contribute to a loss of control. Selecting from a variety of building features can benefit the well-being of patients and the satisfaction of staff.

2. Promote Social Support

28. Ulrich, RS (2001) 'Effects of Healthcare Environmental Design on Medical Outcomes'. In *Design and Health: Proceedings of the Second International Conference on Health and Design* [Online] 49.pp. 59. Available from: https://www.researchgate.net/publication/273354344_Effects_of_Healthcare_Environmental_Design_on_Medical_Outcomes [Accessed: 7th December 2020]

29. Dellinger, B. (2010) Healing Environments. In: McCullough, C. (ed.). *Evidence-based Design for healthcare facilities*. [Online] Indianapolis: Renee Wilmeth. Available from: http://docshare02.docshare.tips/files/7358/73586537.pdf [Accessed: 7th December 2020]

30. Huisman, E.R.C.M., Morales, E., Van Hoof, J. and Kort, H.S.M. (2012) 'Healing environment: A review of the impact of physical environmental factors on users'. *Building and Environment* [Online] 58. pp.70-80. Available from: https://doi.org/10.1016/j.buildenv.2012.06.016 [Accessed: 23rd November 2020]

31. Codinhoto, R. Tzortzopoulos, P., Kagioglou, M., Aouad, G. and Cooper, R. (2009) 'The impacts of the built environment on health outcomes'. *Facilities* [Online] 27 (3/4). pp.138-151. Available at: https://doi.org/10.1108/02632770910933152 [Accessed: 8th December 2020]

32. Schweitzer, M., Gilpin, L. & Frampton, S. (2004) 'Healing Spaces: Elements of Environmental Design That Make an Impact on Health'. *The Journal of Alternative and Complementary Medicine* [Online] 10 (1). pp.71-83. Available at: https://doi.org/10.1089/acm.2004.10.S-71 [Accessed: 24th November 2020]

33. Day, C. (2004). *Places of the Soul - Architecture and Environmental Design as a Healing Art* [Online] Oxford: Elsevier. Available from: https://www.academia.edu/37164088/Places_of_the_Soul_Architecture_and_Environmental_Design_as_a_Healing_Art [Accessed: 30th June 2020]

34. Grieder, M.A. & Chanmugam, A. (2013). Applying Environmental Psychology in the Design of Domestic Violence Shelters. *Journal of Aggression, Maltreatment &Trauma*, [Online] 22(4). pp.365-378. Available from: DOI: 10.1080/10926771.2013.775984 [Accessed: 18th October 2019]

35. Ulrich, RS (2001) 'Effects of Healthcare Environmental Design on Medical Outcomes'. In *Design and Health: Proceedings of the Second International Conference on Health and Design* [Online] 49.pp. 59. Available from: https://www.researchgate.net/publication/273354344_Effects_of_Healthcare_Environmental_Design_on_Medical_Outcomes [Accessed: 7th December 2020]

In a healthcare facility whose design supports access to physical and emotional support from both their families and healthcare professionals, stress can be reduced and health outcomes may be enhanced.

3. Provide access to Nature and other Positive Distractions

Research has demonstrated that exposure to natural views or access to nature can reduce patients' feelings of stress and positively impact their psychological well-being.

Similarly, Dellinger (2010)[36] suggests specific design interventions that can improve the treatment experience by addressing the five senses: sound, touch, sight, smell and taste. These interventions have a positive impact on patients' stress and discomfort in a therapeutic environment:

- Sound stress reduction: Utilizing sound-absorbing materials and separating employee areas can reduce sound stress, as can providing music, placing water fountains, etc.
- Touch stress reduction: Using soft fabrics and natural materials can reduce touch stress.
- Sight stress reduction: Reducing stress through sight is achieved by ensuring clean and uncluttered areas, using coordinated colours and materials, displaying art, and providing means for easy orientation and navigation.
- Smell stress reduction: Reducing stress by filtering the air and using environmentally friendly cleaning products.
- Taste stress reduction: Offering a variety of nutritious and tasty meals throughout the day can reduce taste stress.

The role human senses play in the way people perceive the surrounding environment is also analysed in the Theory of Embodiment. The Theory of Embodiment indicates that the human perception of the surroundings is not solely based on the brain but is shaped by the merge of the entire body and mind as a single entity and as a link with the notion of reality. As stated in this theory, a person's connection to space and how they relate to their environment can be attributed to issues of embodiment.[37] [38] By utilizing the surrounding environment as a tool, our senses shape our perception of reality. This perception impacts how

36. Dellinger, B. (2010) Healing Environments. In: McCullough, C. (ed.). *Evidence-based Design for healthcare facilities*. [Online] Indianapolis: Renee Wilmeth. Available from: http://docshare02.docshare.tips/files/7358/73586537.pdf [Accessed: 7th December 2020]

37. Merleau-Ponty, M. (2006). *Phenomenology of perception*. (C. Smith, Trans.). London: Routledge Classics (Original work published 1945) cited in: Prestwood, LE (2010). Architectural design factors of domestic violence shelters that affect outcomes for female domestic violence victims: a naturalistic inquiry to establish grounded theory for future research. A thesis Submitted to the Office of Graduate Studies of Texas A&M University in partial fulfilment of the requirements for the Degree of Doctor of Philosophy. Texas, US: Texas A&M University.

38. Hatjinikolaou, J. (2019). *The theory of embodiment and the coloured stain*. [Online] Available at: https://www.blod.gr/lectures/h-theoria- tis-ensomatosis-kai-o-hromatikos-lekes / [Accessed: 25th June 2020]

we feel about an environment or an individual. In addition, it can help us assess a place in terms of its harm or nourishment, yielding different degrees of comfort or anxiety.[39] An individual's quality of life within a home environment is determined by the dimensions of embodied realism that address both the physical and psychological aspects of the environment.[40]

As Day (2004)[41] states, 'Architecture, in the sense of environmental design, is the art of nourishing the senses'. Hence, it could be argued that the design of a shelter for vulnerable individuals could be developed in light of an understanding of the relationship between the design elements and the embodied sensory experiences.

Objective 2

A building environment for female sex trafficking victims must offer a range of services that meet the needs of their residents and contribute to their healing process. Aside from the facilities required for their physiological needs, space is needed for the services that will empower them psychologically, develop their skills, and allow them to reintegrate into society over time. According to the collected data and the therapeutic design principles, the layout could be divided into distinct functional bubbles to accommodate privacy and social interaction, individual expression, reflection and discretion. Each of the four bubbles of function operates under the theme of 'safety' (Figure 3).

39. Day, C. (2004). *Places of the Soul - Architecture and Environmental Design as a Healing Art* [Online] Oxford: Elsevier. Available from: https://www.academia.edu/37164088/Places_of_the_Soul_Architecture_and_Environmental_Design_as_a_Healing_Art [Accessed: 30th June 2020]

40. Prestwood, LE (2010). *Architectural design factors of domestic violence shelters that affect outcomes for female domestic violence victims: a naturalistic inquiry to establish grounded theory for future research.* A thesis Submitted to the Office of Graduate Studies of Texas A&M University in partial fulfillment of the requirements for the Degree of Doctor of Philosophy. Texas, US: Texas A&M University. Available from: https://core.ac.uk/download/pdf/147140403.pdf [Accessed: 3rd July 2020]

41. Day, C. (2004). *Places of the Soul - Architecture and Environmental Design as a Healing Art* [Online] Oxford: Elsevier. Available from: https://www.academia.edu/37164088/Places_of_the_Soul_Architecture_and_Environmental_Design_as_a_Healing_Art [Accessed: 30th June 2020]

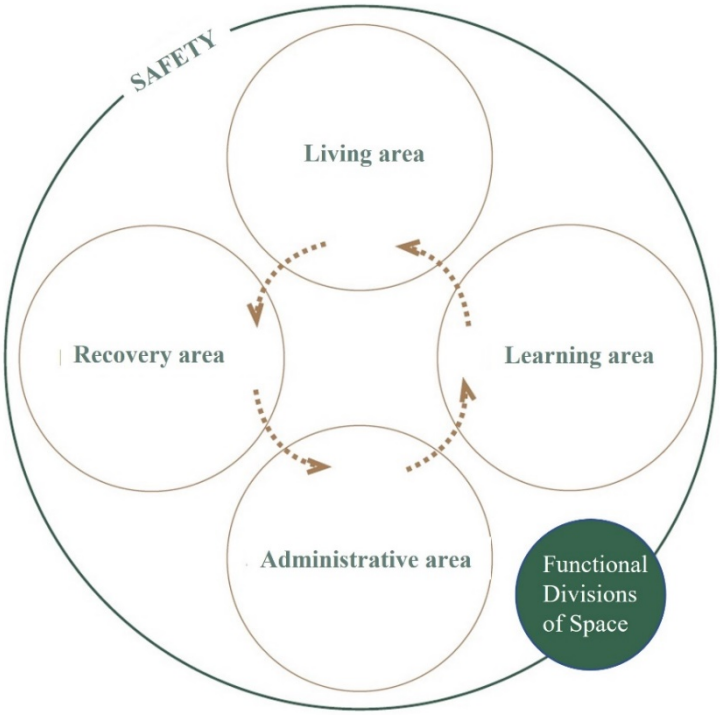

Figure 3. *Functional Divisions of Space*
Source: Papadopoulou 2021.
Data: BC Housing (2017) and Lawson (2010)

The identification of key design features that have a significant impact on the healing outcomes of patients has been made based on the aforementioned studies and the collection of primary and secondary data from numerous sources.[42] [43] [44] [45] [46] [47] These design features should be considered in the design of either a hospital

42. Lawson, B. (2010) 'Healing architecture'. *Arts & Health*, [Online]Vol.2(2). pp. 95-108. Available from: https://www.researchgate.net/publication/ 257353533_Healing_architecture?EnrichId=rgreq-4aefb4e62600cb5178b108698e35f471-XXX&enrichSource=Y292ZXJQYWdlOzI1NzM1MzUzMztBUzoyODQ0MTQxNzQwODkyMTdAMTQ0NDgyMTAzMTIxMg%3D%3D&el=1_x_3&_esc=publicationCoverPdf [Accessed: 21st June 2020]

43. Pearson, M. and Wilson, H. (2012) 'Soothing spaces and healing places: Is there an ideal counselling room design?'. *Psychotherapy in Australia,* [Online]Vol.18(3). pp 46-53. Available from: https://www.researchgate.net/publication/254724357_Soothing_spaces_and_healing_spaces_Is_there_an_ideal_counselling_ room [Accessed: 18th October 2019]

44. Ulrich, RS (2001) 'Effects of Healthcare Environmental Design on Medical Outcomes'. In *Design and Health: Proceedings of the Second International Conference on Health and Design* [Online] 49.pp. 59. Available from: https://www.researchgate.net/publication/273354344_Effects_of_Healthcare_Environmental_Design_on_Medical_Outcomes [Accessed: 7th December 2020]

45. Huisman, E.R.C.M., Morales, E., Van Hoof, J. and Kort, H.S.M. (2012) 'Healing environment: A review of the impact of physical environmental factors on users'. *Building and Environment* [Online] 58. pp.70-80. Available from: https://doi.org/10.1016/j.buildenv.2012.06.016 [Accessed: 23rd November 2020]

46. Dellinger, B. (2010) Healing Environments. In: McCullough, C. (ed.). *Evidence-based Design for healthcare facilities.* [Online] Indianapolis: Renee Wilmeth. Available from: http:// docshare02.docshare.tips/files/7358/73586537.pdf [Accessed: 7th December 2020]

environment or a therapy room.[41] [42] Incorporating these design principles will help to create a comfortable and inviting atmosphere, avoiding the feeling of an institutional environment.

Design Principles

This section describes how the design criteria have been summarised into a list of design principles for designers of building environments for female sex trafficking victims. Each design principle is elaborated in turn as follows:

- Privacy

A space must be designed to give its occupants the option to choose between privacy and companionship following their preferences and needs in the course of their long recovery journey.

- Outdoor views and natural daylight

The design of the building must give the option of the outside view. Windows and openings that allow outdoor views and natural light help in stress reduction and dealing effectively with depression. Research has shown that patients who have access to view and natural daylight have a quicker recovery.

- Nature, biophilic scenes and other positive distractions

Having access to a natural environment and fresh air has therapeutic effects on an individual. Gardening has the potential to give people a sense of purpose since it is an act of nurturing and contributing to something. The benefits of nature cannot only be obtained by simply utilizing plants or having access to a garden, but also by implementing colours that are inspired by nature and that contrast and complement natural elements and textures, such as wood and stone.

- Control

Providing a space with optimal levels of heat, light, and sound (artificial or natural) and the ability to control them, has a profound impact on the environmental comfort of individuals. It is important to note that victims of sex trafficking lacked control for a considerable period of time. Being able to control their environment and experience a degree of independence can greatly facilitate their recovery process. Noise reduction and acoustics privacy are also important considerations. The ability to control seating arrangements during a counselling session can significantly enhance residents' feelings of comfort.

- Materials

Design elements, colours, materials, and textures that create a warm and inviting atmosphere are effective in creating a more relaxing environment. Positive emotions are evoked by the feeling of home/refuge, tidiness, and cleanliness. The

47. Papadopoulou, F. (2020) *Architectural elements that play an important role in the designing of healing spaces*. [Interview] 1st December 2020.

evidence-based design suggests that inspiring spaces with elements of nature and intriguing colours have a profound impact on patient recovery. Using colour can help people divert their attention from internal mental tensions and focus on external positive distractions. A healing environment can therefore utilize vibrant accent colours in combination with softer and calmer ones. The goal is to achieve a balance between a not too aggressive and not too monotone final appearance, according to the use of the room. For counselling rooms, colours that create an ambience of relaxation are preferred, along with softer materials such as carpeting. Room size may also affect an individual's psychological condition: too large or too small spaces can create feelings of insecurity or claustrophobia.

- Navigation

The design of the space needs to convey a clear sense of direction and establish clear distinctions among the various functions of the various areas. The elimination of confusion can help decrease stress and establish a sense of safety and privacy. This is particularly important in large therapeutic environments. Corridors and staircases must be wide enough to facilitate efficient and safe circulation for residents and staff.

- Facilities and staff

Providing amenities that enhance the sense of home, such as televisions, books, magazines, computers, etc. Spaces or rooms that are specifically designed for staff will enable them to work more efficiently.
Besides these prerequisites, spaces also need to meet specific functional requirements to meet the needs of their residents and facilitate their healing process. The rooms and spaces are generally determined by their size and the number of residents and staff members. Further, each space must be sized to ensure functionality, accessibility, efficient circulation, and to meet the physiological and psychological needs of the residents.

Design principles require that all rooms have access to natural light and air. It is however imperative that each area and room within a building's structure is organized in a manner that safeguards the residents' safety. Several factors should be considered, including the type and location of windows; windows could be placed on exterior walls, provided that they are not directly accessible from the street, or they could be placed on internal walls facing an internal garden or courtyard. To ensure the safety and security of the building, exterior areas, corridors, staircases, and elevators must be adequately illuminated and there must be non-slip materials used in areas such as kitchens, bathrooms, and the entranceway. In addition, security cameras and security mechanisms must be installed. In addition, to maintain the highest level of discretion and avoid the appearance of an institutional exterior, it is also important to use materials and colours that harmonize with the surrounding environment[48]. To enhance the sense

48. BC Housing (2017). *Shelter Design Guidelines*, [Online] Available at: https://www.bchousing.org/publications/Shelter-Design-Guidelines.pdf [Accessed:15 October 2020]

of safety and comfort for both participants, the design of the counselling rooms could incorporate two doors/entrances at either end; in case of discomfort during the session, one may leave without having to pass the other individual[49]. Lockable storage solutions should be available in the medical care area, the nurse's office, the resident's bedrooms and all the rooms in the administrative area. Soundproofing is required in every area. There should be a minimum width of 1.2m in all corridors and staircases.[50]

In each bubble of function, there are several rooms and spaces:

Living Area

- Private bedrooms: There should be one en-suite bedroom for each resident with a lockable door that is equipped with the basic amenities (bed, side table, wardrobe) in addition to additional amenities, if space allows (such as a desk, armchair, shelves), including independent lighting and temperature control. Min. size: 9m2
- Laundry room: The facility should have two laundry rooms, each fitted with necessary appliances (washing machines, dryers, sinks, ironing boards and irons) for both staff and residents; one for staff use (bed sheets, towels, cleaning and maintenance equipment) and the other for residents' personal use. According to the number of women being housed, the number of facilities will vary.
- Kitchen: For women to prepare meals, a kitchen counter space (min. size: 4m in total) needs to be equipped with the necessary equipment and electric appliances (sink, dishwasher, microwave, stove, refrigerator, coffee machine) as well as sufficient cupboards and shelves for storage. The installation of a kitchen island with bar stools will facilitate the delivery of cooking lessons that will enable women to learn new skills.
- Dining room: Seating arrangements to accommodate the maximum number of women. Tables for 2-4 users combined with a bar countertop and bar stools would enable such a setup to be achieved.
- Living room / Communal area: Seating arrangements for an average number of women consisting of a mixture of sofas, armchairs, and chaise longues, enabling socializing or relaxation.
- TV / Cinema room: Seating arrangements for an average number of women consisting of sofas and armchairs, TV and satellite installation and a projector for movies.
- Fitness area: An indoor area equipped with fitness and exercise equipment (aerobic, gym, etc.) capable of accommodating an average number of women. An outdoor area equipped for outdoor exercises and/or games.

49. Papadopoulou, F. (2020) *Architectural elements that play an important role in the designing of healing spaces.* [Interview] 1st December 2020.

50. GOV.UK (2015). *The building regulations 2010 – Access to and use of buildings – Volume 2 Buildings other than dwellings.* [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/441786/BR_PDF_AD_M2_2015.pdf [Accessed: 31st October 2020]

- Restroom (WC): A communal restroom located in the Living Area. Min. size: 6m2
- Garden / Courtyard: An indoor garden or an assortment of smaller gardens inside the complex (flower gardens, vegetable gardens, green space, etc.) together with the arrangement of seating for isolation, socialization, and group work activities. Area size should be proportional to the size of the complex.

Learning Area

- Computer training room: A computer classroom suitable for teaching computer skills to the maximum number of women.
- Educational training room: A classroom to accommodate the maximum number of women where different classes or seminars can be conducted, depending on the needs of the women. Through these sessions, they will be able to gain skills that will assist them in their future employment search and adjustment to society, such as language skills and everyday life skills.
- Meeting room for assistance and advice: An office desk in a room where women who require private meetings can talk with support staff members about private matters (e.g., legal assistance, job placement assistance). Min. size: 6m2
- Library-Reading room: A study space equipped with books, magazines, and computers available, designed with seating arrangements to accommodate an average number of women for study and relaxing reading (tables, chairs, armchairs).
- Restroom (WC): A communal restroom located in the Learning Area. Min. size: 6m2

Recovering Area

- Medical care / Examination room: An examination room equipped with all the necessary equipment (examination bed, lockable cabinet for medical supplies, sink, countertop, and office desk) to facilitate medical procedures conducted by outside medical professionals. Min. size: 14m2
- Nurse's office: An appropriately furnished workspace, including a desk, chairs, storage solutions for residents' medical records, and all necessary communication and computer equipment. Min. size: 6m2
- Counselling room: A room adequately equipped for private counselling sessions, including desks, chairs, storage solutions, and armchairs. Min. size: 12m2
- Room for group meetings, group therapy: A room equipped for group meetings and group therapy sessions for the maximum number of women.
- Arts & Crafts room: An area for the storage of art and craft equipment and furniture (tables, shelving units, sinks) for the average number of women.

- Art & Music Therapy room: An arts and music therapy room with sufficient furniture and equipment to accommodate an average number of women.
- Restroom (WC): A communal restroom located in the Recovering Area. Min. size: 6m2

Administrative Area

- Staff's bedrooms: Bedrooms with ensuite facilities and lockable doors for staff members who are required to remain indoors during the night (such as social workers, carers, nurses, etc.). Min. size: 9m2
- Staff's Restroom (WC): Restrooms (men and women) near the staff's offices for staff use only. Min. size: 6m2
- Staff's kitchen: A kitchen countertop (min. size: 2m) with essential kitchen equipment and electric appliances (sink, dishwasher, oven, microwave, hob, fridge, coffee maker) as well as adequate cupboard space for meal preparation by staff members. A dining table with 4-6 chairs should also be available.
- Manager's office: An office workspace equipped with a desk, chairs, storage facilities, and all the necessary communication and computer equipment. Min. size:8m2
- Staff's office: An open plan office with sufficient space and furnishings appropriate for the number of staff members using it, equipped with all the necessary communication and computer equipment.
- Meeting room: A room adequately equipped to accommodate a meeting for 10 people, including all communication and computer equipment.
- Security office: A room located adjacent to the reception and entrance area adequately furnished and equipped with the necessary facilities and equipment (e.g. CCTV). An adequate view of the street and the building's entrance is essential for the security staff.
- Reception area: An area adjacent to the main entrance for the new residents to be greeted upon arrival, which includes a reception desk, storage areas and seating arrangements.
- Storage room: An area with storage solutions (cabinets, shelves, refrigerator, freezer) for storing fresh and dry foods. This area must be adjacent to the loading area.
- Loading area: To facilitate easy delivery of the house's supplies, a loading area should be provided adjacent to the storage rooms.

Parametric Analysis

Once the relevant design principles have been identified, we explored ways in which these principles can be combined into optimal and intelligent solutions. We implemented two different methods to generate an array of possible spatial

arrangements and compared the results. The design principles were translated into an adjacency map, which was utilised as an input for the two methods.

Adjacency Network

Following the analysis of the above data, a network of adjacencies has been developed to achieve optimal functionality of the space (Appendix 1: Adjacency network). An adjacency map is a helpful tool to systematise different activities in a complex programme, identifying significant nodes and mutual dependencies among the activities (Figure 4).

A detailed spreadsheet is also given, which outlines the functional requirements (needs) of each room and identifies the hierarchy of these requirements based on the Design Principles and the activities that occur in each room (Appendix 2: Hierarchy of functional requirements). Through the exploration of current computational tools for automatic space configuration, two computational design methods have been examined as part of the study of this project: the Squarified Treemap and the Magnetising Floor plan Generator.

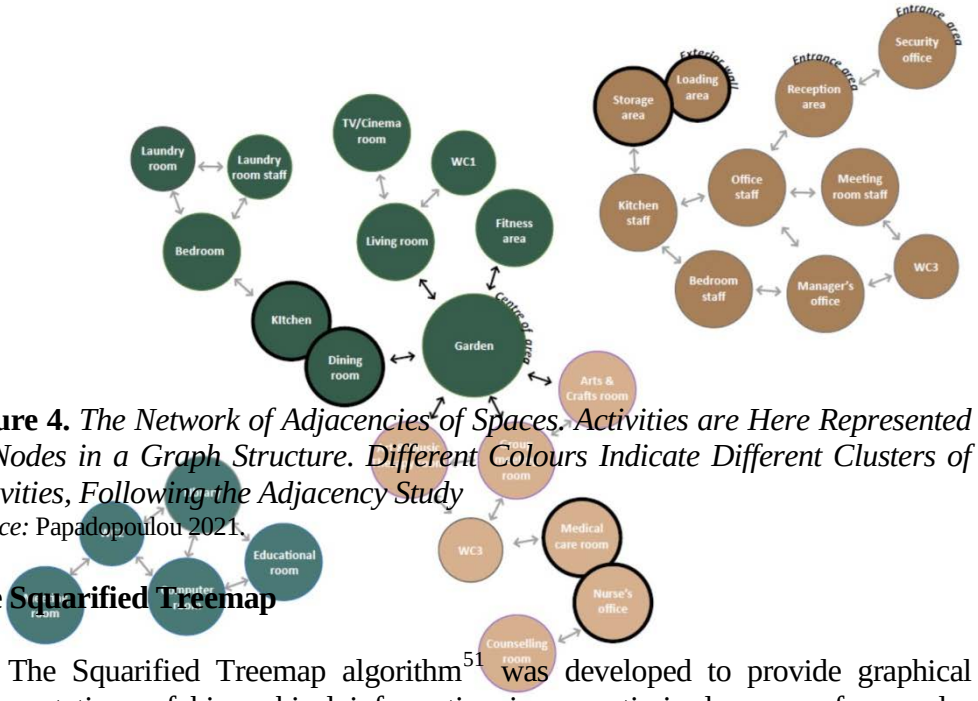

Figure 4. *The Network of Adjacencies of Spaces. Activities are Here Represented as Nodes in a Graph Structure. Different Colours Indicate Different Clusters of Activities, Following the Adjacency Study*
Source: Papadopoulou 2021.

The Squarified Treemap

The Squarified Treemap algorithm[51] was developed to provide graphical representations of hierarchical information in an optimised manner for regular layouts. The Squarified Treemap is a variant of the more common Treemap algorithm[52] that represent a full hierarchical data structure into adjacent squares

51. Bruls, M., Huizing, K. & Wijk, J.J.V. (2000). 'Squarified treemaps'. *Data visualization 2000.* [Online] pp. 33-42. Springer, Vienna. Available from: http://diglib.eg.org/bitstream/handle/10.2312/VisSym.VisSym00.033-042/033-042.pdf?sequence=1&isAllowed=y [Accessed: 6th April 2022]

52. Shneiderman, B. (1992). 'Tree visualization with tree-maps: 2-d space-filling approach'. *ACM Transactions on graphics (TOG)*, [Online] *11*(1), pp.92-99. Available from: https://doi.org/10.1145/102377.115768 [Accessed: 6th April 2022]

based on their relationship in the data tree. Depending on their relationship, data can be represented with elongated rectangles. The Squarified Treemap algorithm improves this, approximating areas to squares. Marson and Musse (2010)[53] implemented this algorithm for the production of floor plans in gaming environments. With its application in spatial configuration, it is possible to produce accurate interior layouts with information about their characteristics. For this study, we used an implementation developed by Thomas Holth (2017)[54] on the code developed by Uri Laserson (2022).[55] The design process begins with the identification of the layout parameters that have derived from the Design Principles of a building environment for female sex trafficking victims.

List of actions

1. Identification of the Design Principles that can be translated into 'space':
    - Navigation: maximisation of the efficiency of circulation by securing:
        a. clear areas of function
        b. min. width of corridors
    - Outdoor views: specific rooms' connection to the garden (Appendix 1: Adjacency network)
        a. Dining room
        b. Living room
        c. Fitness area
        d. Counselling room
        e. Arts & Crafts room
        f. Arts & Music Therapy room
2. Rooms with a fixed position (according to Adjacency network):
    a. Garden: to be placed centrally in the layout
    b. Security office: to be placed next to the entrance area
    c. Reception area: to be placed next to the entrance area
    d. Loading area: to be placed next to the exterior wall
3. Rooms connected to each other, apart from (1. a-f) (Appendix 1: Adjacency network):
    a. Kitchen - Dining room
    b. Medical care room - Nurse's office
    c. Storage room - Loading area
4. Rooms close to each other (Appendix 1: Adjacency network):
    a. Bedrooms – Laundry room - Laundry room (staff)
    b. Bedrooms – Kitchen
    c. Living room – WC 1

53. Marson, F. & Musse, S. (2010). 'Automatic Real-Time Generation of Floor Plans Based on Squarified Treemaps Algorithm'. *International Journal of Computer Games Technology*, [Online] 2010, Article ID 624817. Available from: https://doi.org/10.1155/2010/624817 [Accessed: 26th March 2021]

54. Holth, T. (2017). *Treemap*. Available from: Grasshopper3d.com https://www.grasshopper3d.com/forum/topics/treemap [Accessed: 6th April 2022]

55. Laserson, U. (2022). *Squarify*. [Online] 2nd September 2021. Available from: https://github.com/laserson/squarify [Accessed: 6th April 2022]

d. Living room - TV/Cinema room
e. Computer Training room – Library – Educational Training room – WC 2
f. Meeting room - WC 2
g. Medical care room – WC 3
h. Nurse's office – Counselling room
i. Group meeting room – Arts &Crafts room – Art & Music Therapy room– WC 3
j. Staff's bedrooms – Staff's kitchen
k. Staff's kitchen – Staff's office
l. Staff's kitchen – Storage room
m. Manager's office – Staff's office – Staff's Meeting room – Staff's WC
n. Security office - Reception area
o. Reception area - Staff's office

5. Definition of the parameters of the algorithm:
   a. Navigation
      Index: Efficiency of circulation
      Objective: maximize /optimize the width of corridors
   b. Outdoor views
      Index: Position of rooms in relation to garden
      Objective: allocate the optimal position of each room
6. Based on the areas of the rooms, a curve (rectangle) in Rhino was set as a boundary for defining the spatial configuration of the building environment and was connected to the Squarified Treemap component.
7. The Treemap algorithm divided the rectangle (the area of the building environment) into the four areas of function which contribute to the clear navigation throughout the building (Parameter: Navigation) (Figure 5).
8. Each area was further subdivided into the various rooms it contains. In the bedroom areas (resident bedroom area: 20 bedrooms, staff bedroom area: 4 bedrooms) the rooms were randomly placed (some rooms were placed in the middle of the area) (Figure 6). The numerical order by which the areas of the rooms were imported into the Treemap algorithm had to be taken into consideration and rearranged manually according to the Design Principles and the requirements of previous steps (steps 2, 3 and 4).

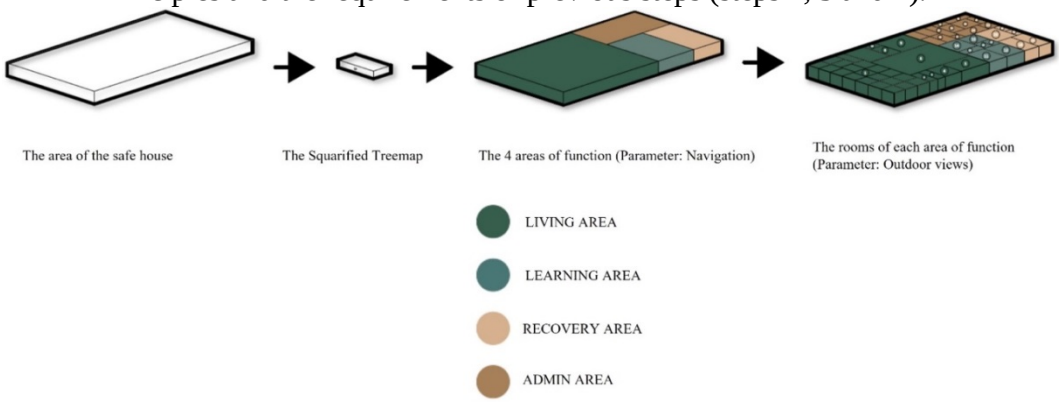

Figure 5. *The Squarified Treemap Process*

Source: Papadopoulou 2021.

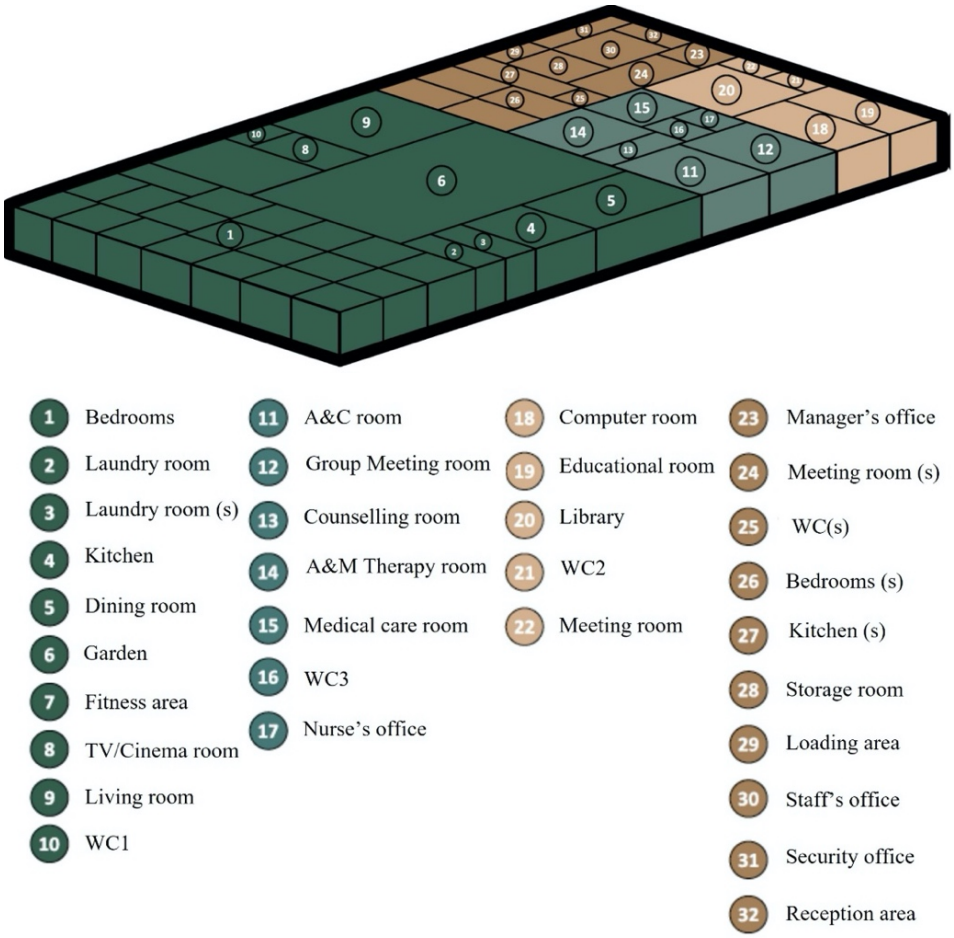

Figure 6. *The Rooms within the Areas of Function*
Source: Papadopoulou, 2021.

The Drawback of Squarified Treemap

- The different areas of function and rooms were organised following an optimised strategy based on an ordered list of areas (from larger to smaller). As the driving criterion here was to fill in all available space into squared areas, this method resulted in the programmatic functions arranged only by size, with no consideration of the adjacency. The result did not adhere to the parameters set (Design Principles and fixed position of specific rooms). To ensure the implementation of the parameters, the order in which the areas of the rooms were imported into the algorithm had to be taken into consideration and manually rearranged.
- The Squarified algorithm develops the spatial configuration within a specific boundary (a curve) in Rhino; a given predefined space is required for the algorithm to work. As a consequence, there are fewer options available for designing a layout that optimally adheres to the Design Principles.

Use of a Genetic Algorithm (GA) with the Squarified Treemap Algorithm

In order to improve the allocation of areas using this approach, including the parameters set and the links between rooms, a Genetic Algorithm (GA) was used to determine the optimal placement of specific rooms.

1. A GA was applied to determine the optimal location of bedrooms in the bedroom area in relation to the garden, (Parameter: Outdoor view). As a result of this process, various solutions were generated.
2. A GA was applied to minimise the distance between the specific rooms that must be connected to the garden (control adjacency) to ensure the optimal placement of each room (Parameter: Outdoor Views). There was no alteration to the initial layout solution created by the Squarified Treemap algorithm during this process.
3. A GA was applied to minimise the distance between the rooms that must be connected to each other (control adjacency) to ensure the optimal placement of each room (Parameter: Navigation). There was no alteration to the initial layout solution created by the Squarified Treemap algorithm during this process.
4. A GA was applied to minimise the distance between the rooms that must be close to each other (control adjacency) to ensure the optimal placement of each room (Parameter: Navigation). This process was not completed since the previous ones failed to produce any results.

The drawback of the Genetic Algorithm with the Squarified Treemap

- Applying a GA in steps 2, 3 and 4 did not produce any usable solutions. The number of rooms was too small and the requirements for the arrangement of these rooms were already met optimally; the numerical order by which the size of the rooms was listed in the Treemap algorithm, following the Design Principles and the requirements described in the steps 2, 3 and 4, was rearranged manually, where necessary.

- Applying a GA in step 1 generated various solutions for the location of bedrooms with minimum distance to the garden (Parameter: Outdoor Views). However, some of the rooms that were generated had odd shapes as the algorithm optimises the shape of the rooms based on their sizes listed in the algorithm.

The Magnetising Floor Plan Generator (MFG)

This algorithm[56] is designed to generate the spatial configuration of public buildings with specified adjacencies between their interior spaces. It allows the user to enter the basic features of each room and calculates the corridors around each room. Different options within various parameters can lead to different results, from which the best is selected according to the evaluation function[57] [58].

List of actions

1. A network of adjacencies was created between rooms following the Adjacency network (Figure 4) and the name and area value of each room was imported. Adding two more links (kitchen – storage room and living room – library) allowed all the areas of functions to be connected (Appendix 3: Adjacency network B) (Figure 7).
2. One room was set as an entrance (reception area). The location of the reception area and the security office must be adjacent to the entrance area (Figure 7).
3. A curve (rectangle) and a point are created in Rhino to establish the boundaries within which the layout will be developed, as well as the location of the building entrance and are both connected to the MFG algorithm.

56. Egor, G., Sven, S., Martin, D. & Reinhard, K., (2020). 'Computer-aided approach to public buildings floor plan generation. Magnetizing Floor Plan Generator'. *Procedia Manufacturing*, [Online] 44, pp.132-139. Available from: https://doi.org/10.1016/j.promfg.2020.02.214. [Accessed: 9th April 2022]

57. Bielik, M. (2019). *Magnetising Floor Plan Generator*. [Online] Available from: https:// toolbox.decodingspaces.net/magnetizing-floor-plan-generator/ [Accessed: 26th March 2021]

58. Hellguz (2021). *Magnetizing Floor Plan Generator* [Online] Available from: https:// www.food4rhino.com/en/app/magnetizing-floor-plan-generator [Accessed: 26th March 2021]

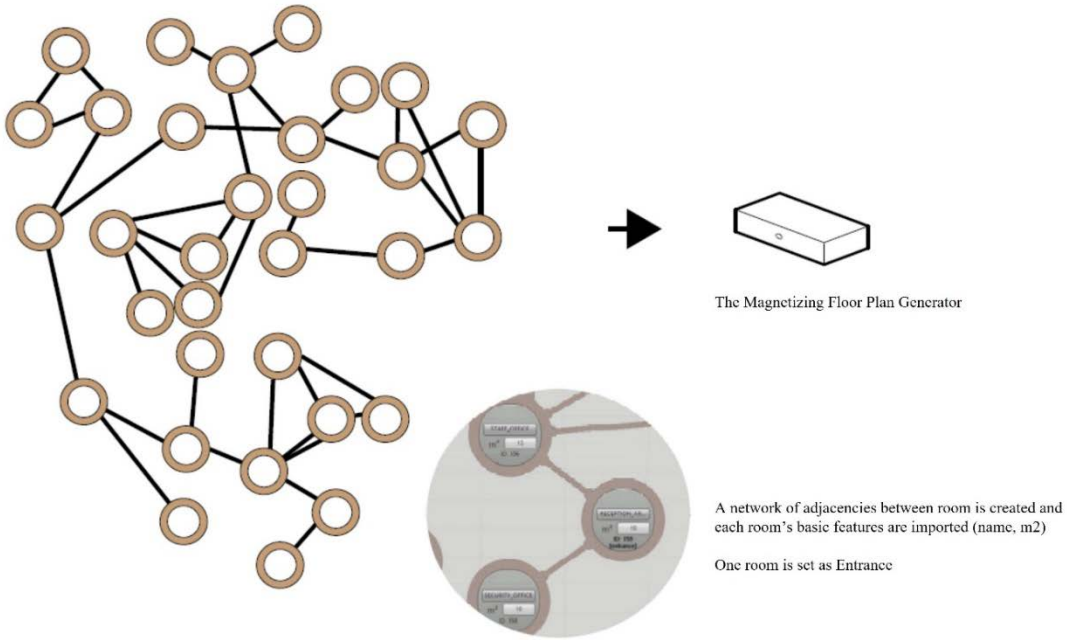

Figure 7. *The Magnetising Floor Plan Generator Process*
Source: Papadopoulou, 2021.

The algorithm ran the connections between rooms according to three parameters: the number of iterations, the maximum distance between rooms and the type of corridors. Different layouts were generated as previews according to these parameters.

After several attempts, the exploration of this process produced 7 layouts that successfully placed all 32 rooms of the building environment (Figure 8).

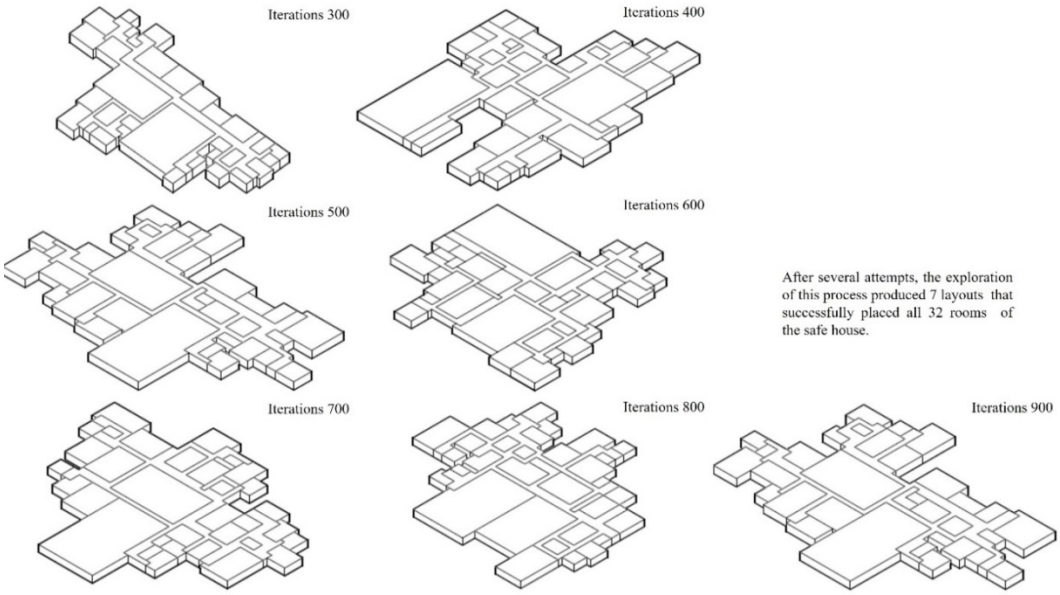

Figure 8. *The Layouts with Iteration 300, 400, 500, 600, 700, 800, 900*
Source: Papadopoulou, 2021.

The Drawback of MFG

The connection between the rooms' network and the algorithm could not be saved and the preview layouts were lost. Once the file was reopened, new connections were required, and new preview layouts were produced. The preview layouts were converted to editable geometry, which resulted in layouts with no discernible borders between the different rooms. The layouts with the best spatial configuration, according to the Design Principles, were converted to PDF and imported into AutoCAD, where they were processed, adjusted and worked on in detail.

The chosen layout

In comparison with the rest of the solutions produced, the layout with Iterations: 700 was chosen as the one that had the optimal spatial configuration based on the Design Principles (Figure 9).

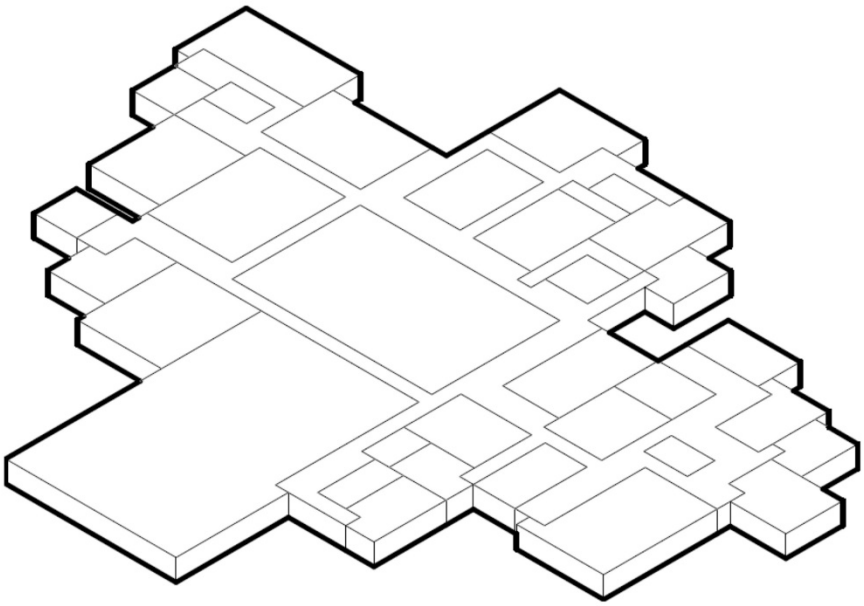

Figure 9. *The Optimal Layout (Iterations: 700)*
Source: Papadopoulou, 2021.

The following specifications were met:

- The four areas of function (living area, recovery area, learning area, administrative area) are clearly defined ensuring the efficient circulation of the residents (Figure 10).
- Residents and staff areas are clearly defined, which, alongside the location of the entrance area, contributes to the feeling of safety, security, and isolation that the women experience both during their stay and upon entering the building environment after being rescued (Figure 11).
- The garden is positioned in the centre of the establishment for maximum security and privacy (Figure 12).

- The positioning of the garden ensures the connection between specific rooms and the garden and the maximum number of rooms with a view of the garden (Figure 13).
- The placement of the rooms with fixed positions, according to the Adjacency network, is secured: garden - centrally placed, security office and reception area - next to the entrance area (surveillance, accessibility), loading area - next to the exterior wall (for speeding up the refilling process) (Figure 14).
- The required adjacencies between specific rooms are ensured (Appendix 3: Adjacency network B and Appendix 4: Adjacency network B-Connections) (Figures 15-16).

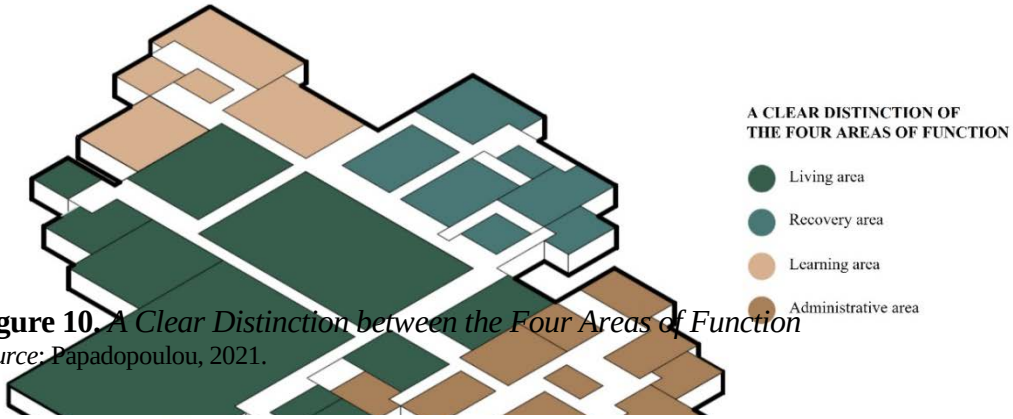

Figure 10. *A Clear Distinction between the Four Areas of Function*
Source: Papadopoulou, 2021.

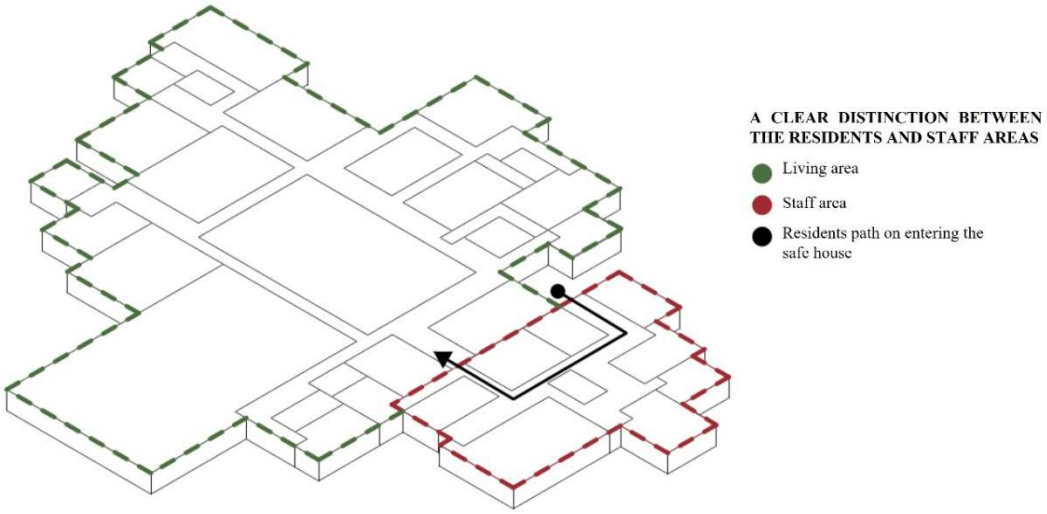

Figure 11. *A Clear Distinction between the Residents and Staff Areas*
Source: Papadopoulou, 2021.

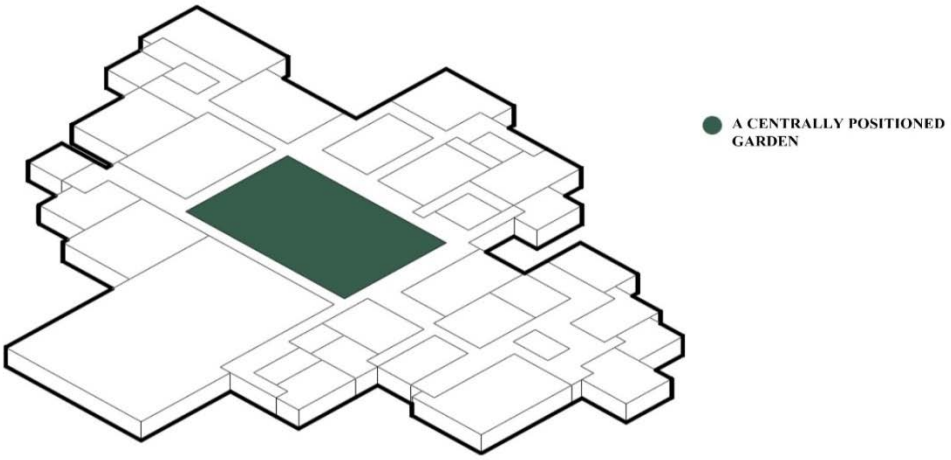

Figure 12. *A Centrally Positioned Garden*
Source: Papadopoulou, 2021.

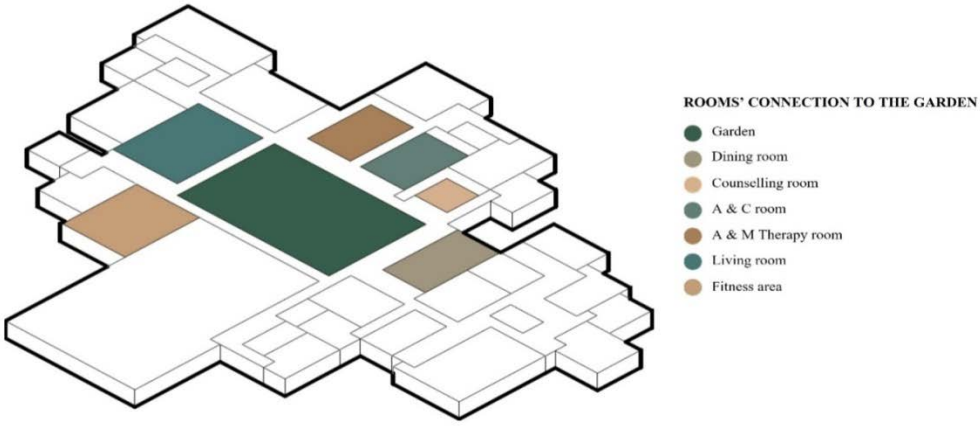

Figure 13. *Rooms' Connections to the Garden*
Source: Papadopoulou, 2021.

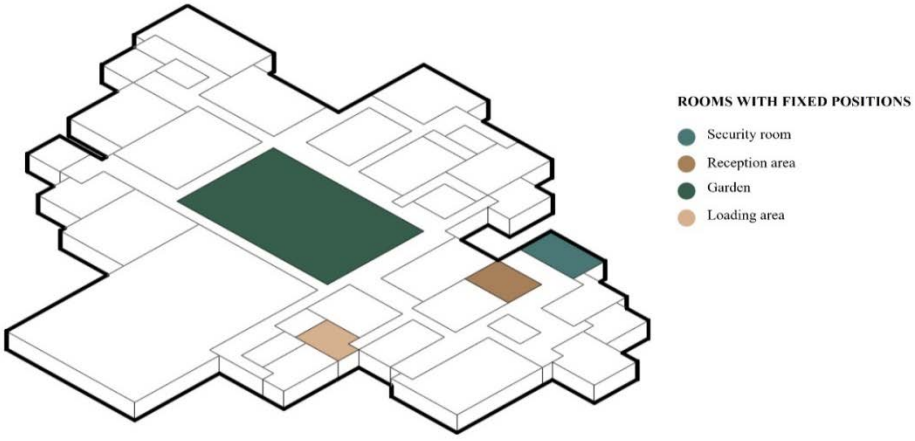

Figure 14. *Rooms with Fixed Positions*
Source: Papadopoulou, 2021.

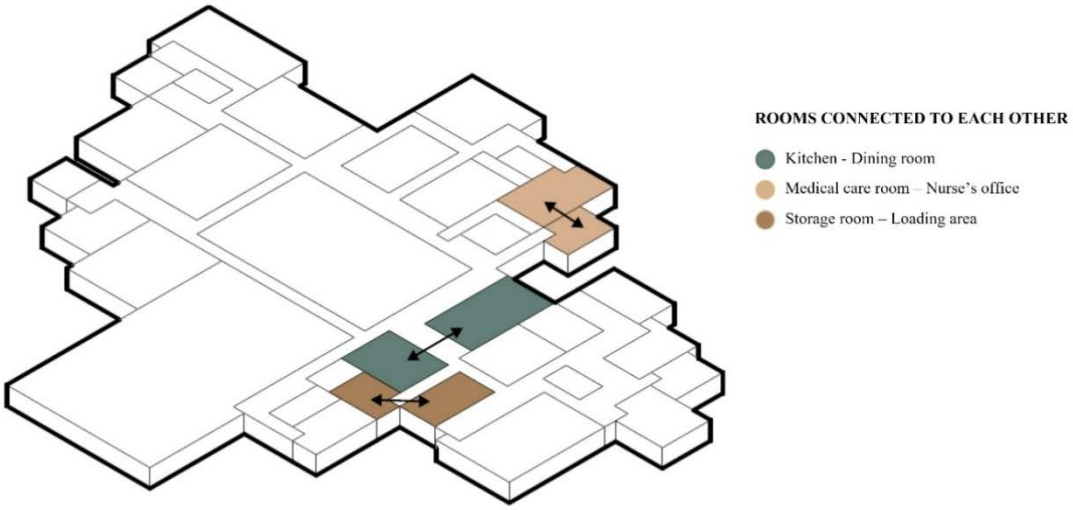

Figure 15. *Rooms Connected to Each Other*
Source: Papadopoulou, 2021.

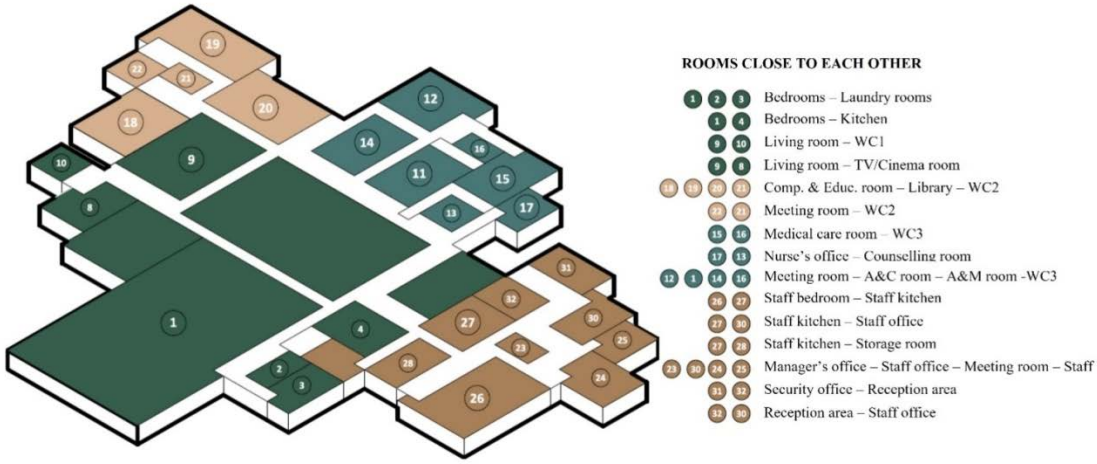

Figure 16. *Rooms Close to Each Other*
Source: Papadopoulou, 2021.

Discussion

The aim of this study was to establish and define design principles and investigate the use of a parametric design method for the design of a building environment for female sex trafficking victims. The design of the built environment was based on a set of specific design principles that could serve as a determining factor in the recovery process for these women through a computational model that would allow for deeper exploration of the design.

Based on the collection and analysis of primary and secondary data, seven design principles were identified that must be adhered to in the design of such spaces. The parameters for the two algorithms that were tested were chosen from the Design Principles that can be translated into 'space'. During this process,

several problems and drawbacks were encountered, which ultimately led to the selection of the Magnetizing Floor Plan Generator algorithm as the most appropriate for this research. Using the findings of MFG, a space was produced that included the criteria established during the design process (the location of specific areas and connections between rooms), allowing for a controlled link between the interior and exterior environments. It generated layouts that, to the greatest extent possible, met the parameters set without being constrained by a predefined shape or boundary. A range of solutions of varying shapes was developed, allowing the designer to investigate and select the one with the optimum spatial layout.

In contrast, The Squarified Treemap required a predetermined fixed shape or boundary to generate spatial layouts, resulting in fewer design alternatives that optimally adhered to the Design Principles. In addition, various manual actions were required to ensure that the parameters were applied.

Through the use of a computational model, a significant number of alternative options were rapidly developed that met the criteria set. From these, the designer selected the one that best represented the optimal spatial configuration. The design principles that could be translated into space (outdoor views and navigation) were selected on the basis of rooms' arrangement and their adjacencies. From there, the designer's expertise may ensure the overall formation of the Design Principles, combining all aspects of them into the design, in order to create a therapeutic environment that supports and empowers women in the rehabilitation process.

Future Work

Further development in the field of building environments for female sex trafficking victims using a parametric design approach can focus on several key areas. Firstly, a physical visit to relevant spaces and the collaboration with individuals directly involved in the operation and utilization of these spaces would provide real-life perspectives, helping us better understand and address space organization and safety concerns. Additionally, expanding the research to include a broader global examination of shelter experiences for such women, considering specific challenges faced in different countries and diverse social and economic conditions (for example populations in very difficult situations like those affected by the Ukrainian war), would enhance our understanding of their unique needs.

Furthermore, in future studies, it is important to consider and test a wider range of computational methods to fully explore the capabilities of the parametric design approach for the project at hand. While the current study has demonstrated the potential of parametric design in developing building environments for female sex trafficking victims, there is still room for further exploration and experimentation, including the feedback from residents and staff of the facilities.

Lastly, future work could consider adopting a three-dimensional (3D) design approach by incorporating multi-level structures, the entire building envelope, and immediate surroundings. This comprehensive perspective would optimize space utilization, improve functionality, and provide benefits such as enhanced outside views and security.

By exploring these areas, future studies can contribute practical design solutions that effectively support and empower female sex trafficking victims, enhancing our knowledge and ensuring the creation of safer and more accommodating building environments for these vulnerable individuals.

Conclusions

The design of building environments for sex trafficking victims has not been sufficiently studied and there are no specific design instructions in contrast to various studies for guidelines for abuse victims' accommodation. However, it is equally crucial to ensure that the design of the accommodation in which sex trafficking victims are placed will work towards their healing process and emotional support, together with the meeting of their needs. This research was conducted with the belief that the building environments for sex trafficking victims are more than secure settings for sleeping and addressing practical needs; they are rather environments that offer protection, shelter and care without being perceived as asylums. Ideally, they should be viewed as places that help the abused individuals develop a sense of belonging, connection and intimacy, as well as prepare the ground for them to take the steps necessary to regain their self-respect and eventually reintegrate back into society.

In this research, a parametric design method was used to develop a building environment for female sex trafficking victims. Using a computational model that could lead to deeper design exploration, this research aimed to design the built environment based on specific design principles that could play a critical role in the recovery process of these women. By analysing their unique design and considering all the relevant parameters and stakeholders, this study investigated how the building environment could help these women recover and set the groundwork for their independent return to society.

This research was focused on female sex trafficking victims. However, the results of this project may also apply to victims of other types of trafficking or abusive environments.

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Appendix 1. *Adjacency Network*

Στήλη1	BEDROOM	LAUNDRY ROOM	LAUNDRY ROOM (STA	KITCHEN	DINING RO	LIVING RO	TV/CINEMA ROOM	FITNESS AR	WC 1	GARDEN	COMPUTER TRAINING ROOM	EDUCATIONAL TRAINING ROOM	MEETING ROOM	LIBRARY	WC 2
BEDROOMS		X	X	X											
LAUNDRY ROOM	X		X												
LAUNDRY ROOM (STAFF)	X	X													
KITCHEN	X				X										
DINING ROOM				X						X					
LIVING ROOM							X		X	X					
TV/CINEMA ROOM						X									
FITNESS AREA										X					
WC 1						X									
GARDEN					X	X		X							
COMPUTER TRAINING ROOM												X		X	X
EDUCATIONAL TRAINING ROOM											X			X	X
MEETING ROOM															X
LIBRARY											X	X			X
WC 2											X	X	X	X	
MEDICAL CARE ROOM															
NURSE'S OFFICE															
COUNSELLING ROOM										X					
GROUP MEETINGS ROOM															
ARTS & CRAFTS ROOM										X					
ART & MUSIC THERAPY ROOM										X					
WC 3															
STAFF'S BEDROOMS															
STAFF'S WC															
STAFF'S KITCHEN															
MANAGER'S OFFICE															
STAFF OFFICE															
STAFF MEETING ROOM															
SECURITY OFFICE															
RECEPTION AREA															
STORAGE ROOM															
LOADING AREA															

X & colour = which rooms must be connected to each other
X = which rooms must be close to each other

Στήλη1	MEDICAL CARE ROOM	NURSE'S OFFICE	COUNSELLING ROOM	GROUP MEETING ROOM	ARTS & CRAFTS RO	ART & MUSIC THERAPY ROOM	WC 3	STAFF'S BEDROOM	STAFF'S W	STAFF'S KITCHEN	MANAGER'S OFFICE	STAFF OFFI	STAFF MEETING ROOM	SECURITY OFFICE	RECEPTION AREA	STORAGE ROOM	LOADING AREA
BEDROOMS																	
LAUNDRY ROOM																	
LAUNDRY ROOM (STAFF)																	
KITCHEN																	
DINING ROOM																	
LIVING ROOM																	
TV/CINEMA ROOM																	
FITNESS AREA																	
WC 1																	
GARDEN			X		X	P											
COMPUTER TRAINING ROOM																	
EDUCATIONAL TRAINING ROOM																	
MEETING ROOM																	
LIBRARY																	
WC 2																	
MEDICAL CARE ROOM		X					X										
NURSE'S OFFICE	X		X														
COUNSELLING ROOM		X															
GROUP MEETINGS ROOM					X	X	X										
ARTS & CRAFTS ROOM				X		X	X										
ART & MUSIC THERAPY ROOM				X	X		X										
WC 3	X			X	X	X											
STAFF'S BEDROOMS										X							
STAFF'S WC											X	X	X				
STAFF'S KITCHEN								X				X				X	
MANAGER'S OFFICE									X			X	X				
STAFF OFFICE									X	X	X		X		X		
STAFF MEETING ROOM									X		X	X					
SECURITY OFFICE															X		
RECEPTION AREA												X		X			
STORAGE ROOM										X							X
LOADING AREA																X	

X & colour = which rooms must be connected to each other
X = which rooms must be close to each other

Appendix 2. *Hierarchy of Functional Requirements*

HIERARCHY OF FUNCTIONAL REQUIREMENTS

LIVING AREA

Private Bedrooms		Degree	Area
sleep	bed, side table	10	3
security	lockable doors	9	
personal hygienne	bathroom with toilet, sink, shower, mirror	8	2.5
light control	choise of functional, mood, general lighting	7	
natural light / fresh air	window (not accessible from the street)	6	
temperature control		5	
storage	wardrobe, chest of drawers	4	1.5
reading	desk, chair, armchair	3	2
min. size 9m2			Total: 9m2

Laundry room (residents)		Degree	Area
washing clothes	washing machine / sink	10	2
drying clothes	dryer	9	2
ironing clothes	ironing board, iron	8	3
storage	wardrobe / shelves	6	1
natural light / fresh air / natural ventilation	window (not accessible from the street)	5	
			Total: 8m2

Corridors and staircases should have a min. width of 1.2m

LIVING AREA

Laundry room (staff)		Degree	Area
washing white linen (sheets, quilts, towels)	washing machine / sink	10	2
drying white linen (sheets, quilts, towels)	dryer	9	2
ironing	ironing board, iron	8	3
security	lockable doors	7	1
storage	cabinets/ shelves for detergents, cleaning equipment	6	
natural light / fresh air / natural ventilation	window (not accessible from the street)	5	
			Total: 8m2

Kitchen		Degree	Area
cooking	hood 60cm, oven 60cm, hob, m/w	10	2.5
food storage	fridge, cupboards	9	5
washing dishes	sink 60cm, dish washer	8	2
preparing food	countertop 90cm	7	3
cutlery & dinnerware storage	cupboards, drawers	6	2.5
natural light / fresh air / natural ventilation	window (not accessible from the street)	5	
surface for cooking lessons / socialising	kitchen island with stools 180cm	4	5
next to dining room			Total: 20m2

LIVING AREA

Dining Room		Degree	Area
eating	tables with chairs for 2-4 people, bar countertop & stools	10	30
socialising	tables with chairs for 2-4 people, bar countertop & stools	9	
natural light / fresh air / natural ventilation	window (not accessible from the street)	8	
playing board games	tables with chairs	7	
next to kitchen			Total: 30m2

Living room / Communal area		Degree	Area
socialising	sofas, armchairs, chaiselongues, coffee tables	10	30
light control	choise of functional, mood, general lighting	9	
relaxing	sofas, armchairs, chaiselongues, coffee tables	8	9
natural light / fresh air	window (not accessible from the street)	7	
reading	sofas, armchairs, chaiselongues	6	5
listening to music	music player, sound speakers	5	
magazine/book storage	bookcase, shelves	4	1
			Total: 45m2

LIVING AREA

TV / Cinema room		Degree	Area
watching TV / movies	sofas, chaise longues	10	12
storage	TV, screen projector, sound speakers	9	3
light control	choise of functional, mood, general lighting	9	
accoustics		8	
next to living room			Total: 15m2

Fitness area		Degree	Area
exercise /working out	gym equipment, mirror walls	10	38
fresh air /natural ventilation	window (not accessible from the street)	9	
flexibility of space	accomodation of different exercise activities	8	
temperature control		7	
storage		6	2
next to garden			Total: 40m2

LIVING AREA

Restroom (WC)		Degree	Area
personal hygienne	toilet, sink, mirror	10	6
privacy	lockable doors	9	
fresh air /natural ventilation	window (not accessible from the street)	8	
min. size 6m2			Total: 6m2

Garden / Courtyard		Degree	Area
gardening	flower garden, vegetable garden, green area	10	80
security	a garden placed in the interior of the complex	9	
relaxing	benches, sunbeds, garden canopies	8	10
socialising	benches, sunbeds, garden canopies	7	10
group work sessions	benches, tables, garden canopies	6	10
outdoor exercise / games	space for outdoor exercise	5	20
			Total: 130m2

HIERARCHY OF FUNCTIONAL REQUIREMENTS

LEARNING AREA

Computer training room		Degree	Area
having computer lessons	desks, chairs, PC's, board, screen projector	10	
security	lockable doors	9	
practising / studying	desks, chairs, PC's	8	
natural light / fresh air	window (not accessible from the street)	7	
			Total: 25m2

Corridors and staircases should have a min. width of 1.2m

Educational training room		Degree	Area
attending classes	desks, chairs, board, screen projector, computer equipment	10	24
storage	bookcase, shelves	9	1
natural light / fresh air	window (not accessible from the street)	7	
			Total: 25m2

LEARNING AREA

Meeting room for assistance and advice		Degree	Area
having one-to-one meetings	desk, chairs	10	6
privacy / accoustics		9	
natural light / fresh air	window (not accessible from the street)	7	
			Total: 6m2

Library-Reading room		Degree	Area
book / magazine storage	bookcases, shelves	10	
reading / studying	armchairs, tables, chairs	9	
surfing internet/ playing games	tables, chairs, 1-2 computers	8	
natural light / fresh air	window (not accessible from the street)	7	
next to living room			Total: 30m2

LEARNING AREA

Restroom (WC)		Degree	Area
personal hygienne	tollet, sink, mirror	10	
privacy	lockable doors	9	
fresh air /natural ventilation	window (not accessible from the street)	8	
min. size 6m2			Total: 6m2

HIERARCHY OF FUNCTIONAL REQUIREMENTS

RECOVERING AREA

Medical care / Examination room		Degree
having medical examination	examination bed, sink, countertop, medical facilities	10
security	lockable doors, cabinets	9
storage	lockable cabinet for medical supplies	8
discussing medical condition	office desk, chairs	7
Min. size: 14m2		Total: 14m2

Nurse's office		Degree
discussing medical condition	office desk, chairs	10
security	lockable doors, cabinets	9
storage	lockable cabinets for residents' medical records	8
Min. size: 6m2		Total: 6m2

Corridors and staircases should have a min. width of 1.2m

RECOVERING AREA

Counselling room		Degree
having one-to-one counselling sessions	office desk, chairs, armchairs	10
light control	choise of functional, mood, general lighting	9
natural light / fresh air	window (not accessible from the street)	8
privacy / accoustics		7
placement of two doors/entrances on both sides		6
next to garden/Min. size: 10m2		Total: 10m2

Room for group meetings, group therapy		Degree
attending group sessions	tables, chairs, specialised facilities	10
light control	choise of functional, mood, general lighting	9
natural light / fresh air	window (not accessible from the street)	8
privacy / accoustics		7
		Total: 25m2

RECOVERING AREA

Arts & Crafts room		Degree
attending classes	tables, chairs, artwork and crafts equipment, specialised facilities	10
storage	cabinets, shelves	9
natural light / fresh air	window (not accessible from the street)	8
		Total: 25m2

Art & Music Therapy room		Degree
having art and music therapy sessions	furniture and specialised facilities for art and music therapy sessions	10
storage	cabinets, shelves	9
natural light / fresh air	window (not accessible from the street)	8
		Total: 25m2

RECOVERING AREA

Restroom (WC)		Degree
personal hygienne	toilet, sink, mirror	10
privacy	lockable doors	9
fresh air /natural ventilation	window (not accessible from the street)	8
min. size 6m2		Total: 6m2

HIERARCHY OF FUNCTIONAL REQUIREMENTS

ADMINISTRATIVE AREA

Staff's bedrooms		Degree
sleep	bed, side table	10
security	lockable doors	9
personal hygienne	bathroom with toilet, sink, shower, mirror	8
light control	choise of functional, mood, general lighting	7
temperature control		6
storage	wardrobe, chest of drawers	5
natural light / fresh air	window (not accessible from the street)	4
min. size 9m2		Total: 9m2

Corridors and staircases should have a min. width of 1.2m

Staff's Restroom (WC)		Degree
personal hygienne	toilet, sink, mirror	10
privacy	lockable doors	9
fresh air /natural ventilation	window (not accessible from the street)	8
next to staff's offices / min. size 6m2		Total: 6m2

ADMINISTRATIVE AREA

Staff's kitchen		Degree
food storage	fridge, cupboards	10
sequrity	lockable doors	9
washing dishes	sink 60cm, dish washer	8
cooking	hood 60cm, oven 60cm, hob, m/w	7
preparing food	countertop 90cm	6
cutlery & dinnerware storage	cupboards, drawers	5
eating	dining table with 4-6 chairs	4
natural light / fresh air / natural ventilation	window (not accessible from the street)	3
next to storage room		Total: 15m2

Manager's office		Degree
doing office work	office desk, chair, communication & computer equipment	10
sequrity	lockable doors	9
storage	cabintes, shelves	8
natural light / fresh air	window (not accessible from the street)	7
Min. size:8m2		Total: 8m2

ADMINISTRATIVE AREA

Staff's office		Degree
doing office work	office desk, chair, communication & computer equipment	10
sequrity	lockable doors	9
storage	cabintes, shelves	8
natural light / fresh air	window (not accessible from the street)	7
		Total: 15m2

Meeting room		Degree
attending a meeting	meeting table & chairs for 10 people, screen projector, computer equipment	10
natural light / fresh air	window (not accessible from the street)	8
		Total: 15m2

ADMINISTRATIVE AREA

Security office		Degree
doing office work	office desk, chairs, specialised facilities and equipment	10
visual access to the entrance		9
visual access to the street	window	8
sequrity	lockable doors	7
natural light / fresh air	window	6
adjacent to entrance area		Total: 10m2

Reception area		Degree
doing admin work	reception desk, communication and computer facilities	10
visual access to the entrance		9
sequrity	lockable doors	8
welcoming new residents	seating arrangements in entrance area, water cooler	7
storage	cabinets	6
natural light / fresh air	window	5
adjacent to entrance area		Total: 10m2

ADMINISTRATIVE AREA

Storage room		Degree
storage of supplies	cabinets / shelves	10
sequrity	lockable doors	9
storage of fresh & dry food	cupboards, shelving units, fridge, freezer	8
adjacent to loading area		Total: 15m2

Loading area		Degree
access to the street		10
sequrity	lockable doors	9
adjacent to storage area		Total: 5m2

Appendix 3. *Adjacency Network B*

Στήλη1	BEDROOM	LAUNDRY ROOM	LAUNDRY ROOM (STA	KITCHEN	DINING ROC	LIVING ROC	TV/CINEMA ROOM	FITNESS AR	WC 1	GARDEN	COMPUTER TRAINING ROOM	EDUCATIONAL TRAINING ROOM	MEETING ROOM	LIBRARY	WC 2
BEDROOMS		X	X	X											
LAUNDRY ROOM	X		X												
LAUNDRY ROOM (STAFF)	X	X													
KITCHEN	X				X										
DINING ROOM				X						X					
LIVING ROOM							X		X	X				X	
TV/CINEMA ROOM						X									
FITNESS AREA										X					
WC 1						X									
GARDEN					X	X		X							
COMPUTER TRAINING ROOM												X		X	X
EDUCATIONAL TRAINING ROOM											X			X	X
MEETING ROOM															X
LIBRARY						X					X	X			X
WC 2											X	X	X	X	
MEDICAL CARE ROOM															
NURSE'S OFFICE															
COUNSELLING ROOM										X					
GROUP MEETINGS ROOM															
ARTS & CRAFTS ROOM										X					
ART & MUSIC THERAPY ROOM										X					
WC 3															
STAFF'S BEDROOMS															
STAFF'S WC															
STAFF'S KITCHEN															
MANAGER'S OFFICE															
STAFF OFFICE															
STAFF MEETING ROOM															
SECURITY OFFICE															
RECEPTION AREA															
STORAGE ROOM				X											
LOADING AREA															

X & colour = which rooms must be connected to each other
X = which rooms must be close to each other

Appendix 4. *Adjacency Network B – Connections*

Στήλη1	MEDICAL CARE ROOM	NURSE'S OFFICE	COUNSELLING ROOM	GROUP MEETING ROOM	ARTS & CRAFTS ROC	ART & MUSIC THERAPY ROOM	WC 3	STAFF'S BEDROOM	STAFF'S W	STAFF'S KITCHEN	MANAGER'S OFFICE	STAFF OFFI	STAFF MEETING ROOM	SECURITY OFFICE	RECEPTION AREA	STORAGE ROOM	LOADING AREA
BEDROOMS																	
LAUNDRY ROOM																	
LAUNDRY ROOM (STAFF)																	
KITCHEN																X	
DINING ROOM																	
LIVING ROOM																	
TV/CINEMA ROOM																	
FITNESS AREA																	
WC 1																	
GARDEN			X		X	X											
COMPUTER TRAINING ROOM																	
EDUCATIONAL TRAINING ROOM																	
MEETING ROOM																	
LIBRARY																	
WC 2																	
MEDICAL CARE ROOM		X					X										
NURSE'S OFFICE	X		X														
COUNSELLING ROOM		X															
GROUP MEETINGS ROOM					X	X	X										
ARTS & CRAFTS ROOM				X		X	X										
ART & MUSIC THERAPY ROOM				X	X		X										
WC 3	X			X	X	X											
STAFF'S BEDROOMS										X							
STAFF'S WC											X	X	X				
STAFF'S KITCHEN								X				X				X	
MANAGER'S OFFICE									X			X	X				
STAFF OFFICE									X	X	X		X		X		
STAFF MEETING ROOM									X		X	X					
SECURITY OFFICE															X		
RECEPTION AREA												X		X			
STORAGE ROOM										X							X
LOADING AREA																X	

X & colour = which rooms must be connected to each other
X = which rooms must be close to each other

CONNECTIONS	ITERATIONS 300	ITERATIONS 400	ITERATIONS 500	ITERATIONS 600	ITERATIONS 700	ITERATIONS 800	ITERATIONS 900
KITCHEN-DINING ROOM	X	X		X	X	X	
DINING ROOM-GARDEN			X	X	X		
LIVING ROOM-GARDEN	X		X	X	X	X	X
FITNESS AREA-GARDEN	X	X			X	X	X
NURSE'S OFFICE-MEDICAL CARE ROOM	X	X	X	X	X	X	X
COUNSELLING ROOM-GARDEN	X	X		X	X	X	
ARTS & CRAFTS ROOM-GARDEN	X	X	X	X	X	X	X
ART & MUSIC THERAPY ROOM-GARDEN	X	X	X	X	X	X	X
STORAGE ROOM-LOADING AREA	X		X	X	X	X	

x: connection achieved

x: connection achieved with minor adjustment