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ACTA ARCHAEOLOGICA LUNDENSIA

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Illumination matters

Revisiting the Roman house in a new light

DANILO MARCO CAMPANARO

DEPARTMENT OF ARCHAEOLOGY AND ANCIENT HISTORY | LUND UNIVERSITY





Illumination played a key role in Roman houses, whose owners could only rely on daylight and flames for lighting and heating. The Roman conception of time itself was closely linked to daylight and darkness and the rhythm of the seasons. In addition, lighting strongly influenced the social atmosphere and the quality of the message conveyed to guests about the owner's wealth and power through the décor. Despite this, social studies on the Roman house have only cursorily addressed this issue. This thesis is the first attempt to address the investigation of the social dynamics of an entire house by including light as a determining agent.

Every visible aspect of the Roman house spoke of its owner and his family. But what is visible is also illuminated, in whole or in part, or is completely or partially immersed in shadow. What can the light and shadows reveal about the social dynamics of the Roman house?

DANILO MARCO CAMPANARO, Department of Archaeology and Ancient History, Lund University. *Illumination matters. Revisiting the Roman house in a new light* is his doctoral dissertation in Classical Archaeology and Ancient History.

Illumination matters

Revisiting the Roman house in a new light

Danilo Marco Campanaro



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DOCTORAL DISSERTATION

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Dr Joanne Berry

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Department of Archaeology and Ancient History
Pb 117
SE-221 00 Lund
Sweden

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Abstract:

Interpreting the social complexity of the Roman house requires a careful evaluation of existing evidence. With this in mind, recent work in the field has proposed a variety of different approaches, focusing each time on a specific type of source (architecture and décor, ancient texts, material evidence from excavated houses), each in turn recursively deemed more adequate for the purpose or more fruitful and less biased. This opposition of approaches and critiques between scholars has yielded an extraordinarily rich picture that, however, leaves some of the social dynamics of domestic space out of our reach. This dissertation, focusing on the case study of the House of the Greek Epigrams in the northern part of Insula V 1 in Pompeii, suggests a further level of understanding that combines the aforementioned types of sources with simulations and digital analyses to support archaeological interpretation.

Everything visible in the house, including its architecture and its decorations, actively participated in the construction of the social identity of the owner of the house and the *Romanitas* of his family. However, everything visible is so by virtue of light, which is not a mere medium, but actively partakes in social dynamics and can be manipulated to meet certain demands. In this dissertation, light is considered in its dual aspect as a physical and as a visual and sensory phenomenon. Starting from the assumption that light is a powerful social agent, the study investigates, through historically grounded and physically accurate lighting simulations and analyses, the intertwined spatial and social circulation patterns in order to derive new insights into the social dynamics of the Roman house.

In particular, this study argues that the social space of the Roman house was characterized by a greater complexity than that conveyed by ancient sources. It suggests a more nuanced picture, one of light and shadow but also of activity at different times of the day and year, and richer in people both in the foreground and in the background.

Key words: House of the Greek Epigrams, Roman domestic space, Pompeii, lighting simulation, lamps, digital archaeology, 3D, virtual reality, eye-tracking, 3D GIS

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Illumination matters

Revisiting the Roman house in a new light

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Back cover photo: Backlit image of the portico of the peristyle of the House of the Greek Epigrams in Pompeii. Photograph: author, courtesy of the Swedish Pompeii Project.

English revised by Rebecca Montague

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To my family

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Danilo Marco Campanaro, March 2023.

List of papers

Paper I

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Paper III

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Paper IV

Campanaro, D.M. & G. Landeschi 2022. 'Re-viewing Pompeian domestic space through combined virtual reality-based eye tracking and 3D GIS', *Antiquity* 96:386, 479–486. <https://doi.org/10.15184/aqy.2022.12>

Paper V

Campanaro, D.M. & G. Landeschi 2023. 'A room with a view? Investigating the Pompeian domestic space using virtual reality-based eye tracking and GIS'. [Manuscript submitted for publication]

Author's contribution to the papers

Papers I, II, and III

Single-authored works.

Paper IV

Co-authored by Danilo Marco Campanaro and Giacomo Landeschi. Campanaro imported the model into the Unity game engine, managed the lighting settings for the simulations, and set up the software for user navigation in the virtual environment. Landeschi imported the eye-tracking data into the GIS environment. Campanaro and Landeschi designed and conducted the experiment and wrote the article.

Paper V

Co-authored by Danilo Marco Campanaro and Giacomo Landeschi. Campanaro wrote the entire article, except for the part on importing eye-tracking data into GIS, which was written by Landeschi.

Abbreviations

3D	Three-dimensional
CAVE	Cave automatic virtual environment
CNR	National Research Council of Italy
DAI ROM	German Archaeological Institute, Rome
DARKLab	Lund University Digital Archaeology Laboratory
GIS	Geographic Information Systems
HUMLab	Lund University Humanities Lab
IBE	Inference to the best explanation
ISTI	Institute of Information Science and Technologies "A. Faedo"
LUNARC	Lund University Centre for Scientific and Technical Computing
MANN	National Archaeological Museum of Naples
VR	Virtual Reality

1 Introduction

When they entered, they found hanging upon the wall a splendid portrait of their master as they had last seen him, in all the wonder of his exquisite youth and beauty. Lying on the floor was a dead man, in evening dress, with a knife in his heart. He was withered, wrinkled, and loathsome of visage. It was not till they had examined the rings that they recognized who it was.

— Oscar Wilde, *The Picture of Dorian Gray*¹

Some, however, say that this was not the vision which the woman had; but that there was attached to Caesar's house to give it adornment and distinction, by vote of the senate, a gable-ornament, as Livy says, and it was this which Calpurnia in her dreams saw torn down, and therefore, as she thought, wailed and wept. At all events, when day came, she begged Caesar, if it was possible, not to go out, but to postpone the meeting of the senate.

— Plutarch *Vit. Caes.* 63.6²

The two iconic figures of aristocrats at the centre of these pieces are seemingly linked only by the common fate of perishing by the strike of a blade. On one side the Victorian and hedonist Dorian Gray, and on the other Gaius Julius Caesar, a Roman politician, and general. On closer inspection, a relationship emerges that binds these figures more closely, in the social interaction between them and the material world around them.

In the novel by the Irish writer Oscar Wilde, the portrait recorded every form of depravity and injustice committed by the young aristocrat Dorian Gray, leaving his beauty eternally intact. Hidden from everyone's view by his owner, it absorbed his irreversible departure from the Victorian ethos. In the second passage, Plutarch dwelt on the omens of death that occurred before the murder of Julius Caesar. He recounted that the night preceding the assassination, Caesar's wife, Calpurnia, had dreamt that a gable-ornament had been torn down. The physical destruction of the

¹ Wilde 1891/1993, 128.

² Plutarch (transl. B. Perrin 1919). *Lives, Volume VII: Demosthenes and Cicero. Alexander and Caesar*, Loeb Classical Library 99, Cambridge, Massachusetts.

house prefigured the end of Caesar's own life, but there is more to it. The corruption of the architectural paraphernalia, envisaged by Calpurnia's omen, pointed to the erosion and disappearance of the public figure of Caesar himself, suggesting a further connection between the house (and its decorations) and the self.³ An indissoluble link existed between the *domus* and the social identity of the Roman man by linking environment (*locus*) and behaviour (*ethos*).⁴ As opposed to the picture of Dorian Gray that, hidden from view, absorbed his gradual estrangement from a respectable Victorian life, the Roman house and its decorations, made to be seen, were the driving force behind the generation of social identity and the shaping of the *Romanitas*.

Both the architecture of the Roman house itself, and the activities of the family within it, contributed to the construction of the social standing through a language that we can only strive to access through literary fragments and material remains. The problem of decoding this language has puzzled a multitude of scholars who have tried over time to interpret the social meaning of domestic space.⁵ This has contributed to a rich but at the same time near-impenetrable picture that has left many questions unanswered, as I will illustrate in the next section. The present research, drawing on those earlier contributions, harnesses an aspect that has previously been under-studied, namely light as a social agent. Through the case study of the House of the Greek Epigrams in Pompeii (V 1, 18) (Figs. 1–3),⁶ three-dimensional digital technologies in combination with the existing sources have been used to leverage light to reveal aspects of this language and come to new conclusions about the social dynamics in the Roman house.

3 Hales 2003, 43.

4 Hales 2003, 40.

5 Carandini & Filippi 1985; Wallace-Hadrill 1988; Clarke 1991; Allison 1997; George 1997; Grahame 1997; Nevett 1997; Ellis 1999; Allison 2004; George 2004; Berry 2016. A thorough review of previous literature on the Roman house would be beyond the scope of this section. See Annette Haug's ongoing project (2020–2023), the "Decorative Principles in Late Republican and Early Imperial Italy (Decor)" volume series, for an extensive overview of the last two decades of studies, together with new approaches that attempt to integrate different typologies of sources. See also Berry & Wallace-Hadrill 2020 on the cultural history of the home in antiquity.

6 A detailed documentation of the house can be found in the relevant section in the open access website platform of the Swedish Pompeii Project: <http://www.pompejiprojektet.se/house.php?hid=7&hidnummer=9374584&hrubrik=V%201,18%20Casa%20degli%20Epigrammi%20greco>

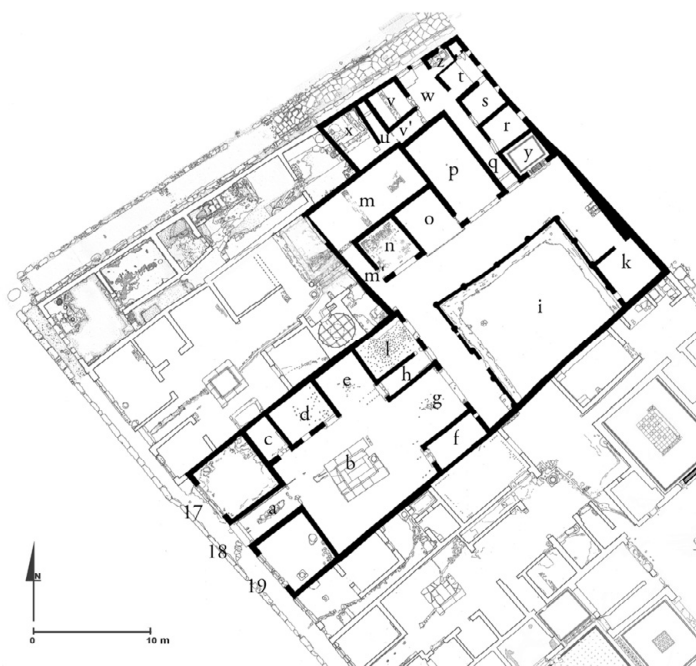


Fig. 1
Plan of the House of the Greek Epigrams (V 1, 18), adapted by permission of the Swedish Pompeii Project.



Fig. 2
House of the Greek Epigrams, view from the *atrium* (b) towards the *tablinum* (g). Photograph: Hans Thorwid, courtesy of the Swedish Pompeii Project.



Fig. 3

House of the Greek Epigrams, view from the *tablinum* (g) towards the *viridarium* (i). Photograph: Hans Thorwid, courtesy of the Swedish Pompeii Project.

1.1 Problematizing the Roman domestic space

Seminal contributions by Andrew Wallace-Hadrill and Paul Zanker inaugurated a new approach to studies in the field of Roman domestic space, which already was enjoying a renaissance, as noted by Zanker in the preface of his book.⁷ Investigations began to distance themselves from an approach that was overwhelmingly art-historical, to tackle questions of broader concern, addressing the dynamic relationship between society and domestic space.⁸ Household remains have

⁷ Wallace-Hadrill 1994; Zanker 1998.

⁸ With this regard, Katharina Lorenz (2015) has identified three different strands of studies as part of an evolutionary development:

- Copy criticism. Widespread in scholarship since the first decades of excavations around the Bay of Naples in the 18th century, copy criticism viewed wall painting as a means of extracting elements shared with Greek originals that might have inspired it, in order to reconstruct them (e.g., Diepolder 1922; Curtius 1929).
- Genre-immanent scholarship. This approach is centred on wall painting intended as a genre of Roman art. Unlike copy criticism, it was not concerned with the individual artists' creative

therefore been interrogated in search of social meanings. Many of the theories envisaged involved circulation and sought a deeper understanding of the intertwining private/public, owners'/servants' realms. Concurrently, criticism has gradually mounted, exposing the limitations of one or more of these specific approaches, while offering possible alternatives. In this sense, Simon P. Ellis's critical reading of some of the major theories of circulation from scholars such as Andrea Carandini, Wallace-Hadrill, and the theoretical model of Bill Hillier and Julienne Hanson would offer an interesting case in point, worth reviewing while considering other relevant contributions.⁹

Carandini's model, described in the report of Villa di Sette Finestre, identified an architectural division of the house in a *pars urbana* and *pars rustica*, respectively the domain of the owner and the domain of the servants.¹⁰ This model entailed seclusion between the two realms, yet with some limited interplay. The assumptions concerning the archaeological evidence make this approach questionable, as it is problematic to assign every richly decorated room to the owner, confining the servants to the sole service quarter. The well-known passage from Pliny the Younger, describing some of the rooms of his Laurentine house as at the same time suitable for slaves, freedmen, and guests, would argue against such a restrictive attribution.¹¹

More subtly, Wallace-Hadrill's model of the social articulation of the Roman house dismisses the owners' seclusion and opens to the ubiquitous presence of the slaves throughout the house, as mediators of the social flux.¹² Two axes, one horizontal (from public to private) and one vertical (from grand to humble) help render the social complexity of the *domus frequentata*. Moving horizontally from public to private, *amici*, *familiares* (closest friends), and *paterfamilias* occupy the "grand" zone of the scheme, while *clientes*, *liberti*, and *servi* stay in the remaining "humble" zone. Appealing as it was, this model still concedes that poorly decorated rooms should be identified as part of the servants' quarter, counter to what the

genius, but with the formative processes of wall painting (taxonomic, formal, stylistic development). The initiator of this strand of thought was August Mau, who classified Pompeian wall painting into four styles in his seminal study of 1882 (Mau 1882; cf. Beyen 1938a; 1938b; 1960).

- Cultural history. This line of thought includes various forms of analytical endeavour oriented above all towards the audience and the context of the artistic product, especially in a socio-cultural sense (early contributions would include Clarke 1991; Bergmann 1994; Wallace-Hadrill 1994).

9 Ellis 1999. For the theories, see Hillier & Hanson 1984; Carandini & Filippi 1985; Wallace-Hadrill 1988.

10 Carandini & Filippi 1985.

11 "*Reliqua pars lateris huius servorum libertorumque usibus detinetur, plerisque tam mundis, ut accipere hospites possint*" (Ep. 2.17.9).

12 Wallace-Hadrill 1988.

above-mentioned passage by Pliny suggests.¹³ Progressing from public to private, with no room falling completely in either of the two spheres, this continuum would afford different levels of access depending on the social standing of the visitor. Despite being well drawn out and explicative of the function of the houses in general in Roman society, as Ellis notes, Wallace-Hadrill's theory falls short in describing circulation and access to the various rooms. Further critical assessment by Michele George pinpoints that when one tries to locate the residents and examine their use of domestic space, Wallace-Hadrill's grid and axes of differentiation become less useful.¹⁴ Mark Grahame, on his part, while recognizing the relevance of this approach, identifies as problematic the assumption the scheme makes of the decoration as the main regulator—in place of the architecture—of the social flux within the house.¹⁵ This would lead to the third critique put forth by Ellis, concerning the theoretical model of Hillier and Hanson.¹⁶ Applied by Grahame to Pompeian houses, yet without achieving the desired results,¹⁷ the Hillier and Hanson formula, according to Ellis, could only be used when “the functions of the main rooms are known”, a formidable task in such a multifunctional and fluid context as the Roman domestic space.¹⁸ Moreover, neglecting the presence of partitions, curtains, and potentially locked doors, the theoretical model of Hillier and Hanson would eventually return mere chains of links discharged of social meaning.¹⁹

Based on his critical reading, Ellis eventually calls for a more pragmatic approach combining the contribution of Wallace-Hadrill and the model of Hillier and Hanson. Leveraging Grahame's findings on the centrality of the peristyle in the circulation within the Pompeian houses, Ellis's model eventually bestows more permanent

13 See Wallace-Hadrill 1988, 79, 82. The names PRIMUS, FELIX, and GERMANUS and some dates found in the north and south wall of *triclinium* m (CIL IV 4044–4045) in the House of the Greek Epigrams might belong, according to PPM III (1990, 540) to slaves possibly living in this room.

14 George 2004.

15 Grahame 1997, 141.

16 Hillier & Hanson 1984.

17 George notes about the application by Grahame (1997) that “if access analysis is the superior method, it is not proven here, since its potential contribution is overshadowed by a reliance on theory to the exclusion of the cultural context from which the archaeological evidence is derived.” (2002, 239).

18 Ellis 1999, 80. Pliny the Younger refers to one room in his Laurentine house that could be used as “*vel cubiculum grande vel modica cenatio*” (Ep. 2.17.10); on multifunctionality of spaces see also George (1997, 24) and Nevett (2010, 98).

19 See Ellis 1999, 81. Lauritsen (2013) has tried to refine the model of Hillier and Hanson focusing on the concept of boundary, in that “a doorway without a door or partition cannot be considered a boundary, as access between the two spaces associated with it occurs freely and without obstruction. Only if access between spaces is impeded by structural features can the presence of a boundary be established”. Recently, Fredrick and Vennarucci (2021) have presented an updated version of space syntax where predictive models of movement are tested through the navigation of virtual models of the houses.

aspects of architecture and décor with a decisive role in steering the social twine of encounters within the domestic space. Concurrently, Lisa Nevett, while recognizing the relevance of the domestic space as an invaluable source of information to understand aspects of society, introduces a precise caveat concerning the risks that the application of Western preconceptions would present.²⁰ She, therefore, suggests an approach less influenced by the weight of the previous scholarship. Notwithstanding her awareness of the importance of the archaeological material as a source for the interpretation of the uses of space in the Roman dwellings, she puts a major emphasis on literary evidence from the 1st century BC to the 1st century AD—although biased and limited—to sketch a broader picture. Eleanor Winsor Leach’s lexical investigation of the vocabulary of the Roman house highlights how terms traditionally applied to the archaeological evidence (for example the *tablinum* and the *alae* as described in Vitruvius) can hardly find a correspondence in ordinary Roman discourse.²¹ Penelope Allison, in a major critical leap, notes how studies combining textual and architectural evidence fall short in investigating the space of the Roman house, merely producing “prescriptive, architectural history rather than a truly social history”.²² Spatial functions and more dynamic concepts would be better understood by leveraging the content of excavated houses.²³ In response to this criticism, Nevett underlines how “Allison’s complete renunciation of textual evidence made questions about patterns of social behaviour impossible for her to address”.²⁴ She, therefore, suggests a combination of ancient texts and archaeological evidence and material from Pompeii to offer a new perspective challenging the traditional image of the “household as revolving around the requirements of an elite male *dominus*”.²⁵ A strand of studies has interestingly focused on the decoration of the Roman house in order to shed light on the social dynamics of the domestic space with a stance from time to time more oriented towards rituality, the use of mnemonic mechanisms, or bringing perceptual attitudes of the viewer to the fore.²⁶

Michele George eventually warns that domestic architecture, written sources, artefacts, and interior decoration only provide clues, without “solving the puzzle”,

20 Nevett 1997, 283.

21 Leach 1997.

22 Allison 2001, 203.

23 Allison 1997; 2004.

24 Nevett 2010, 96.

25 Nevett 2010, 118.

26 See Clarke 1991; Bergmann 1994; Hales 2003; and the more recent “Decorative Principles in Late Republican and Early Imperial Italy (Decor)” volume series by Annette Haug (2020–2023).

making house relations drawn from Pompeian houses appear insubstantial and tentative.²⁷

An entanglement of countering approaches characterizes the social studies of the Roman domestic space. We are left with a rich, yet impenetrable picture where “much of the daily life within the household remains beyond our grasp”: a somewhat disheartening conclusion by George, alleviated by her final suggestion that “newly emerging analytical tools” should be cause for optimism.²⁸ With this regard, the present research suggests that studies investigating the links between light, regarded as a powerful social agent, and the wealth of existing evidence may offer novel insights concerning the relationship between space and social behaviour in the Roman house.

1.2 Aims and objectives

As emphasized in the previous section, the bulk of scholarly precedents have attempted to unravel the use and social significance of space in Roman houses, generating an intriguing but often contradictory set of indications, especially regarding the optimal use of one typology of source over another, which still leaves much of the complexity of these spaces beyond our grasp.²⁹ This study, by delving into light intended as a social agent, a poorly explored aspect in this field, aims at gaining new insights into the social dynamics of the Roman domestic space.

One point of departure is that the external world, both now and then, is disclosed to us through light, which determines whether and when certain things can be seen or not. However, light embodies more than this, as we shall see. It has its own ability to promote and trigger social actions, it can produce exclusions and inclusions, and it can be manipulated to respond to certain purposes. Despite the obvious role played in such “un electrified” contexts, especially in terms of perception and agency of the decorations, light has been marginalized from the discourse on the Roman domestic space and traditionally relegated to economic or typological studies related to the use of oil lamps. When the analysis of spaces and decorations at best included temporality and seasonality, it inevitably had to infer its interpretation from the scholar’s direct experience of material remains. Indeed, the reason for the difficulty of including light within studies of domestic space (but also in other areas) was arguably the very reason that light, like other intangible entities, leaves no trace in

²⁷ George 1997, 319; 2004, 15.

²⁸ George 2004, 7, 23.

²⁹ Notably, Allison warned that “In order for the investigation of Roman domestic space to progress further, a self-critical approach is needed, as is a sound understanding of the nature of the evidence and of the development of the methods used to reveal relationships between the social and the material in the past.” (2001, 183)

archaeological remains.³⁰ This study, therefore, aims to overcome this limitation by proposing a holistic study, extended to an entire Pompeian house, the House of the Greek Epigrams. The fact of including a whole three-dimensional building in the study is of paramount importance, as radiation entering space is not insensitive to its context. Light, in fact, is not identical to itself in any part of the house and is always the result of transformations, reflections, absorption, and refractions. Every ray of light carries the “memory” of the places where it has travelled, so to speak. An example often cited when speaking of the modern rendering techniques used in computer graphics can better clarify this concept. Let us imagine a kitchen table lit from above. If we were to consider only the contribution of the lamp placed above the table, we would not see the legs of the table itself. This, as is known, does not happen due to a phenomenon that in computer graphics is called “global illumination”, whereby the radiation coming from the lamp is reflected by the surfaces of the room countless times, eventually reaching the legs of the table. Radiation carries with it its own biography, the places it has visited, and the surfaces it has impacted. There is indeed an indissoluble link between light and space as stated by the Greek philosopher Proclus or, as Louis Kahn’s axiom stated, that architecture first appears when sunlight hits a wall.³¹ Space is constantly generated and regenerated by light. These two aspects, electromagnetic radiation on the one hand and perception on the other, identify a twofold nature of light, physical and sensory, which this study also draws on.

How are the aims of this study achieved? The process of including light as a social agent poses the need to build architectural and light reconstructive models to generate data and materialize the incorporeal. The objectives of this study are therefore: lighting analyses, simulations of the subjective impression of a scene that mimics the human visual response, and collection and analysis of data relating to the visual experience within a virtual reconstruction of the House of the Greek Epigrams. This poses, as we shall see in this study, two basic problems. How can we connect partial information and fill gaps in our virtual reconstructions? How to handle new data from our three-dimensional simulations? (**Paper I** and **Paper II**). In **Paper III**, light as a physical phenomenon (*lumen*) and as a visual phenomenon (*lux*) was investigated through lighting simulations to understand its contribution to the social orchestration within the Roman house. In **Paper IV**, a new methodology combining virtual reality (VR)-based eye tracking and geographic information systems (GIS) was defined to study ancient perception. In **Paper V** this methodology, centred on movement (of the body and eyes), was adopted to understand how light could influence the way space was perceived in the Roman house. Furthermore, it was investigated how theories of proxemics (distance and position in space) combine with the affordance potential (see section 2.3.2) of

30 Nesbitt 2012, 140.

31 Proclus’ theory is accounted for in Simplicius’ commentary on Aristotle’s Physics (Simpl. *In Phys.* 611.10–614.8). For Louis Kahn, see Perren & Mlecek (2015, 183).

decorative elements bathed in light and shadow to create gradations of spatial ritualization.

1.3 Outline

This work is a compilation thesis (sammanläggningsavhandling) comprising five research articles and a synthesis (kappa) in which their content is summarized, discussed, and harmonized in relation to the main topic of the study. The articles serve as cases for this thesis but individually contribute to a specific field of investigation. The synthesis also offers insights into topics that have not found their proper articulation in the articles due to necessary practical limitations, but that may have a clarificatory benefit for the reader.

The thesis is structured in the following sections:

1. Introduction, providing the background, aims, and objectives of this research
2. Description of the theoretical perspectives underlying the different papers comprising the study
3. Illustration of the methods adopted to pursue the aims dealt with in the papers
4. An annotated chrono-bibliography of the scholarly production on the House of the Greek Epigrams
5. Description of the reconstructive process behind the three-dimensional model of the House of the Greek Epigrams
6. An overview of the five articles, where the purpose of the research, the method, and the results of the individual studies are briefly presented
7. A concluding section that discusses the contribution of the various articles in relation to the purpose of this research by recomposing them into macro-themes
8. Cited works
9. Appendix containing the five papers composing the compilation thesis.

2 Theoretical perspectives

This section introduces the main theoretical strands that underpin this study. Although seemingly disjointed, they find a common denominator (see section 7, the conclusions and implications), in the inferential act as a common thread for the results obtained in this research: the inference of the scholar who interprets and reconstructs the archaeological data; the inferential and mnemonic game through which the guest of the Roman house questioned the mural paintings displayed by the host; the inferential operation through which the visitor understood being part of a ritual dimension in connection with certain perceptual stimuli.

2.1 Bridging the gaps with the inference to the best explanation

Paper I discusses a specific type of inference, the so-called abduction or inference to the best explanation (IBE) in support of the archaeological argumentation, and **Paper II** presents an application of it to the problem of the roof of the *atrium* of the House of the Greek Epigrams. I do not intend here to offer a complete theoretical explanation of the IBE reasoning pattern, which is thoroughly addressed in **Paper I**. However, in this section I would like to provide an explanatory supplement on the use of IBE in relation to this study.

The work of the scholar dealing with the ancient past is invariably plagued by absence and the need to critically weave together the various threads of available information to build our interpretation, which can then result, for example, in a 3D digital model.³² A case in point is the hypothetical reconstruction of the *atrium* roof of the House of the Greek Epigrams investigated in **Paper II**. This draws on studies in the field of Roman domestic space that have proposed a critical re-thinking of the work of previous scholarship.³³ They emphasized how the archaeologist's critical challenge is to find the right combination of careful examination of material remains avoiding epistemological indeterminacy. In particular, they called for the abandonment of deductive reasoning, which tended to force the material remains of

³² Demetrescu 2015.

³³ Nappo 1997; Wallace-Hadrill 1997; Kavas 2012.

the houses of Pompeii and beyond into the Vitruvian mould, in preference to more inductive reasoning.³⁴ As pointed out in **Paper I**, one might think that archaeologists primarily make use of induction. However, inductive reasoning may not be the best solution in the case of particularities of the past. Moreover, in cases where it has been used, it has employed a mechanism that relates back to IBE. A model based on IBE is therefore particularly well suited for archaeological reasoning. Importantly, it helps render explicit and strengthen our argumentation, and if included in the paradata of our 3D models can facilitate the storage and reuse process. IBE has also been a silent companion to archaeological reasoning over time.³⁵ In fact, after the recognition of the inadequacy of the so-called covering law, archaeologists took more disparate theoretical paths. They abandoned the processualist positivism of the 1960s that had also brought attention to the problem of structuring archaeological reasoning. At the end of the 1990s, a tacit agreement on pluralism prevailed, leading to a sort of “epistemic silence”. In the new millennium, this was replaced by a tepid revival of the discourse on epistemology in archaeology.³⁶ Despite being virtually absent from the discourse in archaeological theory, IBE acted as a sort of underlying standard in archaeological reasoning. Notably, since Hodder’s post-processual “hermeneutics” precisely used a form of IBE in the same way that processualist forms of archaeological reasoning did, IBE would eventually act as a bridge between processual and post-processual theories.³⁷

What, then, is IBE? Charles Sanders Peirce first coined the term “abduction” and proposed a specific dynamic involving deduction and induction.³⁸ Abduction would suggest that something can be, and deduction would draw a prediction that could be verified by induction. Later, Gilbert H. Harman proposed his own interpretation of abduction, which he identified as IBE, whereby it follows from the premise that a given hypothesis would provide a “better” explanation of the evidence than any other hypothesis.³⁹ In summary, the best explanation is also the one that is most likely to be true, a truth relative to the evidence and the current state of knowledge.⁴⁰ A few examples may help to illustrate this concept.

In 1859, the French mathematician and astronomer Urbain Jean Joseph Le Verrier noticed that Mercury’s orbit did not behave as predicted by Newton’s equations.

34 Kavas 2012.

35 Fogelin 2007.

36 Lucas 2018.

37 Fogelin 2007. Interestingly Allison noted that “scholars investigating domestic material culture of the Roman world are becoming more self-critical in their concern with marrying the methods of the New Archaeologists with the theories of the Post-processualists and with the questions of the social historians, so that their work is intelligible and indeed of interest to such historians.” (2001, 203)

38 Peirce 1931–1958.

39 Harman 1965, 89.

40 Minnameier 2010.

Mercury's orbit was in fact, among the planets of the solar system, the only one that could not be explained by Newton's laws. All explanations of this anomalous motion in the literature continued to be contradicted by the evidence until, in 1915, Albert Einstein announced the success of his explanation of Mercury's anomalous motion with his theory of relativity.⁴¹

In 1957, Sidney Lumet directed his first movie, *12 Angry Men*, shot almost entirely in one setting, the jury room.⁴² The plot of the movie at first glance seems rather simple. A trial for first-degree murder is taking place in New York: a man has died, and his son is accused of being the murderer. According to US law, the verdict must be unanimous. The jury is also informed that a guilty verdict will certainly condemn the boy to the electric chair. At first, achieving unanimity seems simple: in a preliminary vote, eleven jurors vote in favour of guilt, while Juror 8, played by Henry Fonda, votes for acquittal. This is where the real drama begins. Juror 8 is doubtful, and his doubts will gradually lead the other jurors to change their verdict.

Let us now consider another example taken from everyday life that Frank Cabrera included in his chapter on IBE in the recent *Handbook of abductive cognition*: "Suppose I notice a full six-pack of beer in my refrigerator on a Thursday morning, and then return late that evening to notice that one bottle, and nothing else, is unexpectedly missing. (...) in this case, I merely draw the inference that my wife—the only other occupant of my house— had a beer while I was away".⁴³

These three examples, apparently disparate and unrelated, share something very important from the point of view of the philosophy of science. They are all applications of so-called IBE. In this model of inference, in fact, the premises do not entail the conclusion as in a deductive pattern. In the last given example, one could think that beer-swilling aliens had visited Cabrera's house and stolen the missing beer. However, a hypothesis of an interspatial burglary would be too far-fetched. In the second example, Juror 8 deconstructs the other jurors' arguments by interrogating alternative scenarios to fit the facts. In the case of Mercury's orbital precession, several hypotheses have been promulgated over time: assumption of yet-unknown planets between the Sun and Venus; a flattening of the Sun, presumably because of its rotation; the force of gravity diluting much more rapidly; the gravitational action of matter in the zodiacal light (halo) around the Sun explaining Mercury's anomalous motion. All those proposals were contradicted by further new evidence. Other accounts of Mercury's motion had all required assumptions in addition to Einstein's explanation that Mercury, as the closest planet to the Sun, makes its orbit in a region of the solar system where space-time is disturbed by the Sun's mass. The chosen explanation in all the described cases is the best of all

⁴¹ Emmer 2003, 216.

⁴² Lumet, S. dir. 1957. *12 Angry Men* (Film), Orion-Nova Productions.

⁴³ Cabrera 2022, 2.

possible accounts in the current state of our knowledge of the facts. Eventually, the conclusion is inferred as the one that best explains the given set of data.

2.2 Anthropology of light

A key aspect of this study is the relevance of light (and shadow as its counterpart) as a social agent. In their seminal article, Bille and Sørensen analysed how light relates to people and places and its ability to reveal people in culturally specific ways.⁴⁴ In addition to this, one must consider the potential of light to be used and manipulated to conceal or emphasize aspects of reality. Light contributes to social constructions not only as a medium but also with its own agency, “reflecting notions of identity, cultural heritage, morality, securing possessions”.⁴⁵ In this sense, in order to analyse light and its social orchestration, it is necessary not only to consider it in a physical sense (e.g., by quantifying the amount of light falling on a certain surface) but also as vision and perception (e.g., by simulating the visual response of the human eye).⁴⁶ This dual nature of light is the basis of Anders Liljefors’ visual/physical theory discussed in more detail in **Paper III**. Once again, exemplification can contribute to insight into the anthropology of light as an active component of social life.

In 2007, the 30th anniversary of the Rockox House museum in Belgium was marked by a major initiative.⁴⁷ The painting *Samson and Delilah*, made by Sir Peter Paul Rubens around 1609–1610 for his patron, Burgomaster Nicolaas Rockox, and auctioned on 6 June 1641, removing it from its natural context, was transferred from its current home in the National Gallery in London for temporary display in the place for which it was originally created: it was to be hung on the chimney breast of the Great Parlour or art room of Nicolaas Rockox’s house in Keizerstraat, Antwerp, which today houses the museum. Looking carefully at the picture of the painting during this event, the importance that a reintegration, however temporary, of a work of art into its original context can have, is evident (*Fig. 4*).⁴⁸ However, this much-needed effort to recreate the *hic et nunc* existence of the artwork through a necessary act of relocation did not allow the recreation of the variable and dramatic

44 Bille & Sørensen 2007.

45 Bille & Sørensen 2007, 266.

46 Christopher Tilley (1994, 13) emphasized how the world is not made of inert matter, a dehumanized mathematical space of measurement. Instead, it is an inhabited world, which can be explored through hermeneutic phenomenology, that is, the totality of what lies in the light of day or can be brought to light (Heidegger 1996, 27) and where the subject is a socially and culturally embedded being-in-the-world (Heidegger 1996, 58; Thomas 2001, 179).

47 I am grateful to Prof. Anne-Marie Leander Touati for pointing me to this case.

48 Jaffé 2007.

illumination of the open flame of the fireplace.⁴⁹ This is evident if we compare it with the painting *Supper at the House of Burgomaster Rockox* by the Flemish painter Frans Francken II (Fig. 5). *Samson and Delilah* had been carefully planned in relation to its placement above the fireplace, in constant dialogue with light: the light within the painting, the light outside the painting, and their dialogue with observers. Rubens played with the light coming from a wall lamp under the statue of Venus depicted in the painting and with the light of the candle that burnishes the fingers of the old servant and with the light of a brazier and the torch of the guards. In Francken's painting, Delilah's right arm and Samson's lower leg accord with the natural light streaming through the window of the Great Parlour. The flickering glow of the fireplace would have undercut the faces of the onlookers creating a mirror effect between the luminous theatricality of the painting and the real space that was outside it.⁵⁰ Light, therefore, entered fully into the social dynamics by displaying its agency. In the 17th century, following the revolt against Spain which had reduced its international influence, Antwerp was struggling to establish itself as a centre for the production of art and luxury. It could not afford to ignore its many patrons, burghers (some of whom were nobles) committed to spreading the fame of their city.⁵¹ By commissioning works of art, Nicolaas Rockox wanted to increase his prestige and that of his patrician house on the Keizerstraat. This painting entered fully into this dynamic, in which illumination is manipulated to blur the lines between fictitious and real spaces, thereby contributing to the construction of the social identity of the Burgomaster.

In the famous centrepiece of the *Metamorphoses*, Apuleius recounts the myth of Cupid and Psyche.⁵² Psyche, the youngest of three daughters of a king and with an indescribable beauty comparable to that of Venus, convinced by her envious sisters, decides to peek at her lover Cupid in contravention of his instructions. He in fact hides his identity and visits her at night as her spouse. With the help of a lamp, Psyche approaches Cupid, believing him to be a monster, with the intention of striking him with a sharp knife. The dim light of the lamp, however, reveals the true face of the god of love, his hair drenched with perfumed ambrosia, his wings dewy with light, his neck white, and his cheeks purple. Light is again an accomplice in the unfolding of the narrative plot, but it is more than this: the lamp is itself a living being that reacts to the beauty of the god,⁵³ trembling as does Psyche as she tests the tips of Cupid's darts. This artifice triggers a deep falling in love of Psyche who in ecstasy covers her spouse with kisses. The lamp, once again charged with its agency,

49 On the concept of the irreproducibility of the work of art due to its unique existence in one place ("here and now"), see Benjamin 2008.

50 Jaffé 2007, 11.

51 Jaffé 2007, 33.

52 Apul. *Met.* 4.28–35, 5, and 6.1–24.

53 "*Cuius aspectu lucernae quoque lumen hilaratum increbruit*" Apul. *Met.* 5.22.

out of perfidy or jealousy or simply because it too wished to touch and, in its own way, kiss such a beautiful body, sprinkled from its flame a drop of boiling oil on the god's right shoulder.⁵⁴ In the face of the broken promise, without a word Cupid flies away from the sight and touch of his unhappy wife.

Importantly, light and shadow and their dialectics can be reflected more directly in the spatial organization of society such as in the case of the Berber house described by Pierre Bourdieu. According to Bourdieu, light and darkness played an essential role in the organization of Berber domestic life.⁵⁵ The house consisted of two areas, the lower and darker part in contrast to the upper, lighter part, which Bourdieu refers to the female and male spheres. Light and darkness defined the division of labour between the sexes, with women being responsible for most of the things that happened in the dark part of the house. However, the dialectic between light and shadow not only prompts a gender division of domestic space: the construction of the social status of women in the Berber house feeds on the relationships of proximity and light. The status of a young woman was indicated by the position she held with respect to the loom, which was located near the front door. Prior to the wedding, she would sit in the shadow of the loom; on the wedding day she would stand in front of it, with the light coming from the front door falling on her; finally, she would position herself with her back to the "wall of light", namely the wall illuminated by light filtering from the entrance door.

Light, in the case of the Berber house, recalls the social mechanism of inclusion, of a girl's progressive journey towards the mature stage of the married woman, but at the same time of exclusion from those areas of the house flooded with light pertaining to man. Exclusion and inclusion through light is also the theme of a case discussed by Bille and Sørensen for which the Danish term *hygge* becomes the trigger. The term does not have a direct translation into any other language, and its closest English equivalent is "cosiness". It indicates the use of diminished light in communal gatherings.⁵⁶ Friends and family members who remain under the soft light are naturally included in this social ritual while the untranslatable term *hygge* creates esoteric belonging to a restricted and exclusive linguistic group.⁵⁷

54 "(...) *lucerna illa sive perfidia pessima sive invidia noxia sive quod tale corpus contingere et quasi basiare et ipsa gestiebat, evomuit de summa luminis sui stillam ferventis olei super umerum dei dexterum.*" Apul. *Met.* 5.23

55 Bourdieu 1970.

56 As clarified by Larsen (2019, 84–85) "The word *hygge* derives from the Norwegian language and dates further back in time to Old Norse. The Old Norse roots of the word are related to fire, whose heat and light offer protection from the dangers outside the home. In this respect, *hygge* necessitates (and creates) safety in small, protected 'cozy' settings."

57 Bille & Sørensen 2007, 276.



Fig. 4

The painting *Samson and Delilah* by Peter Paul Rubens hanging in the Rockox House in Antwerp on 16 November 2007 to mark the 30th anniversary of the opening of the Rockox House as a museum. *Samson&Delilah*, National Gallery London, on loan at museum Snijders&Rockoxhuis – 2007, courtesy of the Museum Snijders&Rockoxhuis.



Fig. 5

Frans Francken II, 1630-35, *Supper at the House of Burgomaster Rockox*, oil on canvas, Alte Pinakothek, Bayerische Staatsgemäldesammlungen, Munich. Public domain, via Wikimedia Commons.

2.3 Ritualization, affordance, and proxemics

In **Paper V** three different approaches, ritualization, affordance, and proxemics, were combined to investigate the perception of ancient space by “the mobile eye on a mobile head on a mobile body” in relation to the role played by light.⁵⁸ In this section, I will examine the three approaches to clarify their different features.

2.3.1 Ritualization

Catherine Bell, drawing on Foucault’s analytics of power, highlighted how ritual can be seen as a fundamental strategy of power. The ritual is thus a practice that affects the actions of others, a series of prescribed and repetitive movements that simultaneously constitute the body, the person, and the macro- and micronetworks of power.⁵⁹ Thus, a ritual can be regarded first and foremost as a strategic game of power, domination, and resistance. It is a strategy for building power relations and

⁵⁸ Webster 1999, 916.

⁵⁹ Bell 2009, 204; Foucault 1980.

thus a form of control over others within certain social organizations. But it can also facilitate the escalation and resolution of a struggle in a conflicted relationship.⁶⁰ A complex and interactive relation between ritual and society therefore exists, as each society builds its own rituals and rituals help define a society.⁶¹ Moreover, rituals can be of various kinds (secular and religious, but also political, private and collective, of rebellion and solidarity, etc.), and many scholarly contributions over time have sought to distinguish what is ritual from other forms of activity. In this regard, Bell has introduced the term “ritualization”, to avoid forms of strict categorization but at the same time a relativism whereby everything can be understood as ritual. The term ritualization therefore emphasizes the way in which certain social actions are strategically distinguished from others and culturally specific ways of acting are orchestrated to distinguish and prioritize what one is doing from other, usually more everyday activities.

Interestingly, in his study on the houses of Roman Italy, John R. Clarke emphasized the ritual component of the Roman house.⁶² Every facet of the domestic living space would have been structured and shaped around a two-pronged ritual dimension. First, in its customary sense, this would have entailed ritualized formal activities characterized by strict ceremonial, usually with a religious purpose, known collectively as *sacra privata*.⁶³ Second, rituals of the domestic space would have also involved secular activities such as the reception of clients in the morning, or *salutatio*, and communal dining where the social status of the person would have been visible.⁶⁴ This two-pronged ritual dimension of the domestic space would have

60 Bell 2009, 89.

61 Wilkins 1996, 3.

62 Brown 1961; Clarke 1991.

63 On the distinction between public rites in contrast to private rites, see Schörner 2017. Household deities were worshipped, the most important being the *lares*, often represented in pairs as young men wearing tunics, holding drinking horns and framing the *genius*, or spirit of the *paterfamilias*. Important rituals of passage took place in the house, for example, to manhood (Pers. *Sat.* 5.30–31; Prop. 4.1.131–132; see also Harmon & Haase 1978, 1596 and Clarke 1991, 9) or girlhood (Persius 2.70; Schol. Cruq. *ad Hor. Sat.* 1.5.69; Varro in Non. 863.15L; see also Harmon & Haase 1978, 1598). Equally important were the rites of birth (Macrob. *Sat.* 1.16.36; Mart. 10.24.4–5; Plutarch *Quaest. Rom.* 287F–288B; Sor. *Gyn.* 2.5[10]; see also Dasen 2010, 297) and the mourning of death (Mart. 10.24.4–5; Ov. *Tr.* 3.3.81–84; Paulus *ex Fest.* 17 L2; Petr. *Sat.* 65.10; Pliny *HN* 21.VIII.11; Serv. *ad Aen.* 6.216; Tac. *Ann.* 6.5; Tert. *De corona* 10; see also Toynbee 1971; Clarke 1991, 10).

64 On the *salutatio*, see Mart. 2.5, 4.8. On communal dining, see Hor. *Sat.* 2.8.18–41; Mart. 12.41; Petron. *Sat.* 31.8, 65.7; Sen. *Controv.* 9.2.20; Sen. *De brevitate vitae* 7.2; Tac. *Ann.* 3.53.4–54.1. With regards to the specific ritual of the *salutatio*, scholars have wondered over time whether this temporal framework could be applied to Pompeii. The emphasis on reception and dining rituals in the houses of Pompeii has been underlined by several scholars (Wallace-Hadrill 1988; Clarke 1991; Laurence 2006; Viitanen & Ynnilä 2014). Laurence (2006, 165) emphasizes that the temporal framework was a standard for most Italian cities, and thus applicable to the spatial structure of Pompeii. Goldbeck (2010, 22–23) suggested that the *salutatio* would be restricted geographically to the city of Rome. Kärfve (2022, 26, 48) has recently concluded that in Pompeii there was probably no need for more grandiose greeting rituals as in Rome, but nevertheless, the *atrium* houses served as a public stage, albeit in a

demonstrated to the whole household but also to the outside world that the family would live according to the traditions of Rome. Staging these domestic rituals would have helped the construction of the Roman family's identity.⁶⁵ Interestingly, even in the literature of Rome, there was no clear definition of this *Romanitas*, which was in fact constantly renegotiated and depended on the successful interplay between different identities, familial, civic, and personal.⁶⁶ This would tie in with Bell's discourse on the constant mediation between continuity and change at the heart of the ritual dimension. Some things within the ritual would remain as they are in an apparent timelessness to ensure a certain continuity in those who share the ritual and evoke a tradition.⁶⁷ However, tradition also changes in structure, detail, and interpretation, and these changes are not always apparent to those who experience them.⁶⁸ Rituals would mediate stasis and change, inventing tradition in a way that ensures a sense of legitimate continuity with the past by identifying groups and distinguishing them from one another.⁶⁹

Paper V adopts this theoretical underpinning, contending that the ritualization of the spaces in the Roman house is not static but may vary in relation to the combination of the affordance of pictorial elements and the distance of the observers, identifying gradation of rituality.

2.3.2 Affordance

James J. Gibson introduced the concept of "affordance" in his psychophysical theory of perception as what the environment "offers the animal, what it provides or furnishes, either for good or ill" and would imply "the complementarity of the animal and the environment".⁷⁰ This led him to posit that action and perception are linked via affordances,⁷¹ or that the environment offers specific possibilities for action (affordances). Previous scientific orthodoxy considered perception as an indirect process mediated by cultural representations. This model, deeply influenced by the work of Herman von Helmholtz, was centred on the idea of perception as a three-way relationship between a subject, an object, and an internal representation

controlled manner. Social dining itself and the arrangement of the guests followed a very precise ceremony.

65 Hales 2003, 3.

66 Hales 2003, 163.

67 Wilkins 1996, 3.

68 Bell 2009, 118.

69 Bell 2009, 119. On the invention of tradition, see Hobsbawm & Ranger 1992, 1–14.

70 Gibson 1979, 127.

71 Chong & Proctor 2020, 120.

of the object based on previous experiences and knowledge.⁷² In response to this model, Gibson developed the notion of “direct perception”, or that information can be acquired directly from the environment. In this sense, for example, the possibility of being a chair to sit on would reside in the object itself without the need for this to be categorized as a “chair”. This brings us to a precise caveat. Tracing back the origin of the term affordance to the Gestalt psychologist theory, Gibson reappropriated Kurt Koffka’s statement that “each thing says what it is” so that “a fruit says ‘Eat me’”.⁷³ In the very same way, a letterbox would “invite” the mailing of a letter.⁷⁴ However, what would happen in the case of a postal service employee who had to put a letter in a letter box that stands beside a litterbin? What would prevent him from slipping it into the wrong container?⁷⁵ This example is not intended to prove that Gibson’s theory is invalid, but rather that it is too radical. Unfortunately, Gibson’s death shortly after deploying his idea did not allow for further refinement, creating continuing puzzles among scholars of ecological psychology.⁷⁶

In recent decades many studies have attempted the compromise of combining indirect and direct perception, which would give the concept of affordance an important role to play in archaeology, where it previously failed to attract much attention.⁷⁷ In this sense, an effort was made to intertwine anthropology and psychology.⁷⁸ This operated a sort of mediation between direct and indirect perception with a focus on affordance and social dynamics. Along the same lines, Mark Gillings channelled Anthony Chemero’s relational theory that affordances should not be considered as properties of animals or environments but rather as relationships between the two.⁷⁹ In this sense, affordance could thus be shared in social interactions and become the object of manipulation processes related to social mechanisms aimed at identity creation and the formation of power relations.⁸⁰

72 von Helmholtz 1971.

73 Koffka 1935, 7.

74 Gibson 1979, 138.

75 Palmer 1999, 411–412.

76 Gillings 2012, 608.

77 Llobera (1996) has pioneered the application of Gibsonian theories to archaeology (contra, see Webster 1999). See also Knappett 2005. Gillings has taken up the issue of applying Gibson’s theory to the archaeological problem (2009) and rehabilitated Llobera’s work that had been criticized by Webster (1999), suggesting new possibilities for using affordance theories taking advantage of GIS technologies, such as, for example, viewshed analysis (2012). On the topic, see also Wernke *et al.* 2017. For a comprehensive discussion of the literature on the use of GIS and affordances see also Landeschi 2019.

78 de Fornel 1993; Ingold 2000.

79 Chemero 2003; Gillings 2012.

80 Wernke *et al.* 2017, 24.

The affordance theory thus defined is deployed in **Paper V** by harnessing the analytical power of GIS to study how the visual message from painted walls invokes rituals used to construct the owner's social identity and how this varies under the combined effect of distance and illumination.

2.3.3 Proxemics

Edward T. Hall coined the term “proxemics” as “the distance between men in the conduct of daily transactions, the organization of space in his houses and ultimately the layout of his town”.⁸¹ Hall defined four different zones from observations and interviews conducted among people living on the north-east coast of the United States.⁸² He identified an intimate distance, a personal distance, a social distance, and a public distance, including two further levels of differentiation for each zone (respectively labelled distant and near phases). The number of zones corresponded to a precise working hypothesis that animals (and therefore humans) use their senses to distinguish one space from another. Thus, an intimate distance would involve sight, smell, and the warmth of the other's body, but also the sensation of breath and smell as denotative features (including distances less than 0.45 m). Personal distance, on the other hand, would be a sort of protective bubble that organisms place between themselves and others (from 0.46 to 1.2 m). The social distance would begin accordingly after this phase and would be determined by an increasing number of details of the other person that the eyes can ascertain. It would end at 3.6 m, where the public space begins. At this distance, a subject would be able to deploy an escape strategy in the face of danger, a change in language would occur, and the vision may cover less and less information such as the fine details of the skin and the colour of the eyes. At about 9 m, the distance from the audience of the last zone, gestures would become prominent, and the voice and all other aspects would need to be exaggerated.

An interesting development of this theory is that the zones defined by Hall are by no means to be understood as universal and only represented the sample involved in his investigation.⁸³ In this light he considered several variants, examining proxemics in a cross-cultural context and arriving at the definition of proxemics as a sense of space that synthesizes different sensory inputs: visual, auditory, kinaesthetic, olfactory, and thermal. Accordingly, the study of culture in the sense

81 Hall 1963, 1003. David Wheatley (2014), channelling Hall, presented proxemics as model to investigate how the different senses are “implicated in social interactions at different spatial scales” (126).

82 Hall 1966, 113–190.

83 Hall points out that, for example, in societies such as the Spanish or Portuguese, the identified categories (intimate, personal, social, and public), should rather fit into family/non-family patterns (1966, 128).

of proxemics would consist of how people use their senses in different emotional states and during different activities.

In **Paper V**, the theory of proxemics is extended to the spatial relationship between human beings and the characters depicted in the wall paintings, investigating the emotional relationships established in the context of the different ritualities.

3 Methods

3.1 The IBE model

In section 2.1, I introduced IBE from a theoretical point of view; here, I briefly illustrate its application by means of a model discussed in **Paper I** and especially in **Paper II**.

As previously noted, using the IBE pattern it is possible to investigate a set of available data and arrive at an interpretative solution that is the best possible in the current state of knowledge. Cameron Shelley pointed out that the abduction mechanism can occur through visual imagery and that this can contribute greatly to the construction of explanations in archaeology and anthropology.⁸⁴ Indeed, in the case of questions of a complex nature, a formalized model is required that allows recording the argumentative path adopted by the scholar in arriving at his or her interpretations. Such a model (*Fig. 6*) starts with a set of data selected according to the specific research question. These are then explained by one or more hypotheses. These hypotheses are then combined into what I have come to call accounts, or antagonistic interpretations. In the end, only one explanation from the pool of available accounts will be chosen.⁸⁵ The model thus defined and applied to the specific case (e.g., in **Paper II** to the question of whether the *atrium* of the House of the Greek Epigrams was covered or not) makes it possible to define a kind of schematic description. This is no substitute for the standard archaeological narration but rather complements it and can, by virtue of its flexibility, accompany the scholar's publication or the 3D models in the archiving phase, facilitating their reuse. Further, 3D models, showing the scholar's interpretation in three dimensions, can be constructed through a process based on IBE. The reconstruction obtained in this way is nothing other than the best as we know it. This means that as much in the case of 3D reconstructions as in that of "pure" archaeological interpretation, as new information enters, the constructed chain of reasoning can start again, and new best explanations can be generated. As shown in **Paper II**, the 3D model itself then is not a mere end-product. The whole chain of reasoning consisting of the data selected based on our research questions, hypotheses, and accounts does not have a

⁸⁴ Shelley 1996.

⁸⁵ The criteria for making this selection were discussed at length in **Paper II** and will therefore not be dealt with here.

linear structure, but rather a fluid one. As can be seen, the same 3D model can provide new insights and become the basis for a new IBE process. For example, through lighting analyses, new data are brought to the attention of the scholar and the chain of reasoning can start again by finding new solutions concerning a new archaeological problem.

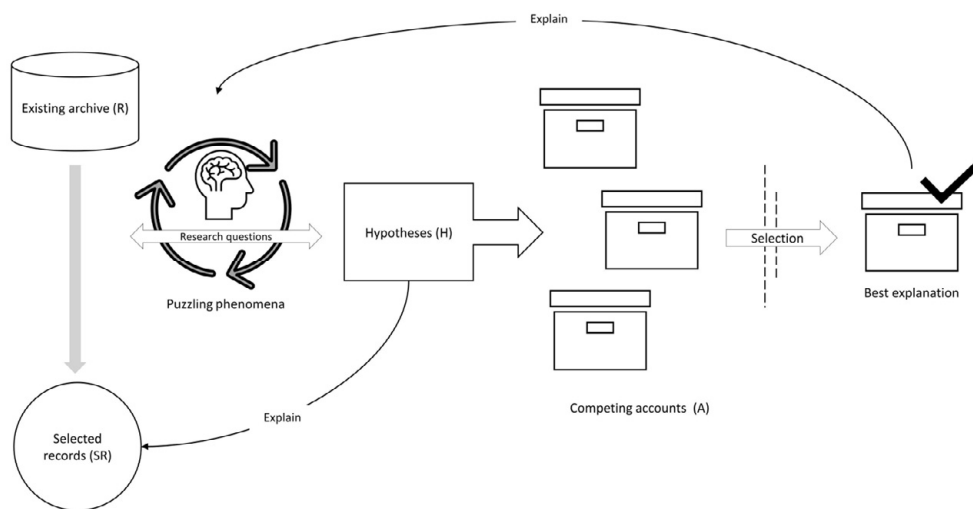


Fig. 6

The IBE-based model for the recording of archaeological argumentation. Records are selected (SR) based on the specific research question. A set of hypotheses (H) explains one or more of the selected records. The hypotheses are then grouped into competing accounts (A). In the end, only one of the competing accounts will be selected as the one that best explains the given set of records.

3.2 3D as an analytical tool

The use of 3D models for archaeology can now be considered an established aspect of everyday practice and academic research.⁸⁶ This phenomenon has certainly gained momentum in recent decades thanks to the improvement and spread of software for photogrammetric reconstruction of reality-based models. However, the use of the digital models made by archaeologists somewhat recapitulates the history of the use of physical models.⁸⁷ Although examples of scale models found in ancient tombs in Egypt date back to the 2nd millennium BC, and Vitruvius himself discussed the use of models, it is in the Renaissance that the adoption of scale

⁸⁶ Dell'Unto & Landeschi 2022, 18.

⁸⁷ Frischer & Dakouri-Hild 2008, viii.

models took on a modern meaning.⁸⁸ In particular, Leon Battista Alberti (1404–1472), in his treatise *De re aedificatoria*, emphasized how models can be used not only to show one’s ideas to patrons and donors and calculate the related costs, but also to develop those very ideas.⁸⁹ Filippo Brunelleschi (1377–1446) introduced the use of a scale model for the design of the dome of Santa Maria del Fiore to test its geometric and structural properties.⁹⁰ Notably, three-dimensional physical models for archaeology have been used since the 18th century:⁹¹ an example is the model of the Temple of Isis that King Gustav III of Sweden commissioned from Giovanni Altieri after he visited Pompeii in 1784. Altieri’s model marked a new stage, representing the temple not as an isolated monument and reproducing its state of preservation.⁹² This was also the case with the famous cork model of Pompeii built by Felice Padiglione in the 19th century, which I will discuss more extensively in section 5.1.2.1 as a source in support of the interpretative reconstruction of the House of the Greek Epigrams. The novelty introduced by this model was that everything was documented, not just the paintings and the most valuable architectural aspects.⁹³

We have seen in the previous section the importance of visual abduction in archaeological interpretation, as noted by Shelley, who also emphasized its potential in connection with the use of digital technologies. The visual inspection of a reconstructive model, as well as the reconstruction procedure of the model itself, make it a fundamental cognitive and knowledge-producing tool, already analytical *per se*.⁹⁴ However, a little-discussed aspect in the field of archaeology is the use of 3D models for measuring and quantifying phenomenological data.⁹⁵ Thus, the 3D model often becomes the final product at the end of the knowledge production chain, frequently serving as the goal rather than the means. Its use is often limited to scientific dissemination, that is, through inclusion in museum visitor itineraries, or in the worst scenario, it is used to produce two-dimensional data (plans, sections). An interesting application that has been made of reconstructive models is related to the simulation of phenomenological experience, especially using VR technologies

88 Vitruvius. *De Arch.* 10.16.

89 Frischer & Dakouri-Hild 2008, viii–ix; Stavrić *et al.* 2013, 26.

90 Frischer & Dakouri-Hild 2008, viii–ix; Stavrić *et al.* 2013, 27.

91 Dell’Unto & Landeschi 2022, 20.

92 Kockel 2004, 144.

93 Kockel 2004, 148.

94 The analytical value of the model as a tool for producing knowledge had already been emphasized by Leon Battista Alberti who, as we have seen, saw the model as a means of refining the architect’s ideas.

95 A thorough discussion on the use of the digital models not only as an illustration but as a heuristic tool can be found in Frischer & Dakouri-Hild 2008.

to review previous approaches.⁹⁶ An equally important strand concerning the use of 3D models in archaeology for analytical purposes is in combination with GIS platforms for various aims.⁹⁷ In this study, in particular, the reconstructive model of the House of the Greek Epigrams was used to produce quantitative as well as qualitative data, thus materializing normally intangible aspects: for example, the amount of light flux reaching a surface, or quantifying portions of the space perceived under specific visual modalities (**Paper III**), or measuring perception data within the space through combined VR, eye tracking, and 3D GIS technologies (**Papers IV and V**). This provided access to otherwise unavailable information which, in combination with the archaeological data already available concerning the house, made it possible to advance our understanding of the social dynamics of the Roman house.

3.2.1 Lighting simulation

In section 2.2, I emphasized the importance of leveraging light as a social agent and how, by studying the contribution of light in ancient space, it is possible to decode more about the use of space and its social meaning. As stated by Claire Nesbitt, studying light is a quite complex matter because light obviously leaves no traces in archaeological remains, so archaeologists need to learn the past light and darkness by proxy.⁹⁸ In the field of the design of new buildings, it is obviously much more common to study illumination. In this context, it is crucial to determine the amount of natural light that the designed building will be able to rely on. This will also enable the designers to determine the number and type of artificial lights to be introduced. However, as Anders Liljefors pointed out in his lighting theory, light in its physical terms, as radiation, represents only one of the aspects a designer should consider.⁹⁹ Another aspect too often forgotten is the visual dimension of light, due to the misconception that what we see is less reliable (for example, due to faulty perception). In addition to this, there has also been much confusion over the use of the term “light” over time. From a physical point of view, we should more correctly speak of light as electromagnetic radiation capable of initiating the vision process. The radiation in fact passes through a whole series of translucent diaphragms, arrives at the retina, and here is transformed into an electrical signal and then processed by our brain.¹⁰⁰ One of the reasons for the sense of bewilderment regarding the use of the term light is due to the fact that this part of the

96 Fredrick & Vennarucci 2021.

97 Dell’Unto & Landeschi 2022.

98 Nesbitt 2012, 140; Bille & Sørensen 2021.

99 Liljefors 1999.

100 Boyce 2014, 46.

electromagnetic radiation has often been, and in some cases still is called, the visible spectrum, when in fact the radiation is not visible, as Arthur Zajonc illustrated with an experiment.¹⁰¹ When speaking of light in the visual sense, one should consider all aspects of vision and perception. In this sense, light is visible. An example can help to understand the difference between visible and invisible light. Let us take light rays entering a cathedral: we can only see those light rays because the radiation hits the motes that are scattered in the air and then reaches our eyes and becomes vision. The electromagnetic radiation that makes up those rays is not visible; we could not see it except by interaction with the dust. When the German philosopher Gernot Böhme addressed the experiment conducted by Zajonc by emphasizing how incomprehensible his insistence on the invisibility of light is, it is only because Böhme and Zajonc see light from two different standpoints, visual and perceptual in the first case, physical in the second.¹⁰² To understand light totally, therefore, it is necessary to consider both aspects described, physical and visual. For instance, calculating the amount of radiation reaching the surface of a desk and establishing that office work can be carried out on it tells us nothing about the visual experience of people temporarily living in that environment. This is also true for all other types of buildings (e.g., houses, museums), where the kind of experience we want to convey is extremely important and not simply the fulfilment of the legal requirements regarding the minimum lighting level of a room.

In the present study, Liljefors' theory originally conceived for modern buildings is applied to an ancient building with a kind of reverse-engineering process. In this case, having only the archaeological remains at hand, a fundamental component, as repeatedly remarked, was the 3D reconstruction. To carry out this analysis, I used software normally employed in the field of lighting design. This made it possible to carry out for each hour of the Roman day of the solstices and equinoxes the measurement of the amount of daytime radiation that each part of the house could count on and the portion of radiation reflected by the surfaces (more directly related to what we see), as well as mimicking the human visual response. The former provided important indications of the activities that could take place within individual spaces. The latter provided crucial information about human vision in different spaces, such as the deterioration in colour perception and loss of focus when switching from day to night vision or the presence of veiling glares.¹⁰³

101 Zajonc (1995) exemplifies at the beginning of his book that we cannot see light. To demonstrate this, he describes an experiment in which the light sent into a box via a projector does not reach its walls, thanks to a device. When a wand is put into the box it flashes through the dark space. Only in the presence of an object would we see the light that is otherwise invisible.

102 Böhme 2017.

103 This necessitated a series of further reconstructions explained in detail in **Paper III** such as the determination of the historical dates of the solstices and equinoxes and the relative solar co-ordinates, and the reconstruction of a model of the photometric behaviour of an oil lamp, to simulate its contribution in the specific software.

3.2.2 Virtual reality, eye tracking, and GIS

In section 2.3, I presented three theoretical approaches (ritualization, affordance, and proxemics) which underpin a study aiming to understand how lighting affects ancient perception (**Paper V**). By incorporating the movement (of the body and the eye) of users, this study further aims to understand how the rituality of ancient domestic space is “activated”. As we have seen, the Roman house can be understood as a domain where the ritual dimension is of paramount importance. The position of the visitor in the space would have determined the activation of certain social mechanisms with visual elements deploying gradations of affordances. The owner of the house would have exploited this possibility and arguably used lighting or shadow to trigger mechanisms for the production of social hierarchies and identity construction. The method used for this study involves a combination of VR, eye tracking, and GIS. VR is an exploratory modality that has become increasingly popular both for museum exhibitions and with researchers working in the field of cultural heritage. These systems are often used primarily for scientific outreach, but increasingly they are also used in the field of research. For instance, they have been used to validate the historical accuracy of three-dimensional reconstructions using a cave automatic virtual environment (CAVE).¹⁰⁴ One factor that has hampered the application of VR in the research field is the challenge of quantifying the experience within virtual reconstructions. For this purpose, the study described in **Papers IV** and **V** employed a head-mounted display for the VR implementation of eye-tracking technology.

Eye-tracking technology has long been used in various scientific fields by different groups of researchers, such as sports scientists, usability analysts, cognitive scientists, psycholinguistics, etc.¹⁰⁵ This research tool allows us to measure eye movements, such as where we look (gaze) and when our eyes linger, and for how long (fixation). In the specific case study, the measurements took place in a virtual environment (the 3D reconstruction of the house) whereby specific software was able to capture information related to our experience inside the house. By following the user’s eyes, it is in fact possible to formulate an understanding of the observer’s attentional processes.¹⁰⁶ Human beings are not able to process all the available information, so only a certain part can be attended to at one time, and this is particularly true of vision.¹⁰⁷ By leveraging on a faculty called attention, human vision acts as a piecemeal process whereby several small regions are integrated to build a coherent whole (*Fig. 7*). The eyes thus operate by scanning the outer world

104 Dell’Unto et al. 2013. A Cave is a room in which the walls, floors, and ceilings are projection screens. The user wears a head-mounted display and interacts via input devices such as joysticks or similar.

105 Holmqvist *et al.* 2011.

106 Duchowski 2007, 3.

107 James 1981.

through a series of rapid movements (saccadic movements) that may happen three times per second and pausing for temporary stops (fixations). What is thus drawing our attention? This question is directly connected with another issue related to the use of VR in the field of historical studies. The phenomenological experience is performed by modern users within a virtual reconstruction, so there is a risk of superimposing an ethnocentric model that distorts the research results.¹⁰⁸ Although the organ system responsible for transferring electromagnetic radiation to the brain has remained virtually unchanged since the time of the volcanic eruption of AD 79, this obviously does not allow for an uncritical overlapping of information gathered by modern western users navigating reconstructed ancient contexts. Indeed, human perception, despite the relative biological stability of the organs concerned, is naturally influenced by our past experiences, and culture. This aspect is therefore of paramount importance and needs further clarification. In everyday life, many objects can attract our attention because they stand out from the background, because they are distinctly different from those around them, whether in colour, contrast, movement, or orientation.¹⁰⁹ These bottom-up factors characterize the so-called “visual salience” of the objects or their capacity of attracting the attention of the observer. This is an involuntary process pertaining to a sphere of perception that is not influenced by cognitive aspects.¹¹⁰ On the other hand, as observed by William James, our experience is what we agree to attend to.¹¹¹ Top-down, cognitive factors influence attention, namely aspects related to our here-and-now living. The research described in **Paper V** leverages in particular the influence of light on the attentional mechanism and the distance from which it is possible to detect and describe certain elements (e.g., a wall painting), factors that belong to a low-level sphere. Specifically, it aims precisely to describe these aspects through the involvement of five people with very different experiences and not necessarily working in the field of archaeology. Obviously, disentangling low-level and high-level aspects would be an insurmountable undertaking for anyone who is an eye-tracking scientist.¹¹² For this reason, a series of very specific tasks were assigned to the users involved in this research to control the cognitively driven aspect of perception.¹¹³ A well-known

108 “There is a definite need among scholars working in this area to maintain a critical and self-reflexive approach to their interpretations. To continue to move forward, inherent biases, often based on our own ethnocentrism, need to be first identified and then removed” (Allison 2001, 203).

109 Goldstein & Brockmole 2016, 127.

110 Opitz (2017) has interestingly experimented with software able to identify visually salient elements in still pictures taken from a video recording of a 3D reality-based model of the Knowth passage tomb in Ireland.

111 James 1981, 402.

112 Goldstein & Brockmole 2016, 128.

113 This procedure was identified through a series of dialogues with cognitive psychologists from the Humanities Laboratory at Lund University.

experiment conducted by Alfred Yarbus shows in fact how the task assigned to an observer influences the attentional pattern of the related experience (*Fig. 8*). In the specific case of this study, tasks were assigned in relation to three spatial areas of the house: the *atrium* (b), the painted wall east of the *viridarium* (i), and the room with the epigrams (y).

A very important step in the experiment conducted for **Papers IV** and **V** was the audio recording of the users' experience. This made it possible to ask the observers specific research questions about what they could detect. The same tasks were tested under two markedly different lighting conditions, during the first Roman hour of the winter solstice (around 7:30 am), and during the seventh hour of the summer solstice (around noon). With the use of software, it was possible to segment and annotate the audio recordings, based on the precise timestamp (time or range of time) relative to the specific feedback to our research questions and transform them into tables to be connected to the 3D eye-tracking data.¹¹⁴ Metrics concerning the users' experience within the virtual reconstruction of the house were collected through the spatial analytics platform of the Cognitive 3D software;¹¹⁵ these concerned the gaze, fixations, and the path followed by individual users through the virtual environment. These data were subsequently imported into a GIS environment to exploit its analytical capabilities and answer specific research questions.¹¹⁶

114 The software is Elan, developed by the Max Planck Institute for Psycholinguistics in Nijmegen (<https://archive.mpi.nl/tla/elan>).

115 <https://cognitive3d.com/>.

116 This contribution fits well in the debate concerning visibility and visual experience studies in archaeology. See Opitz (2017, 1205–1208) for a thorough historical review of the different positions involved and the current developments. Opitz highlighted how contemporary contributions are based on the trade-off between being grounded in measurable data and the recognition that the experiential data cannot be ignored.

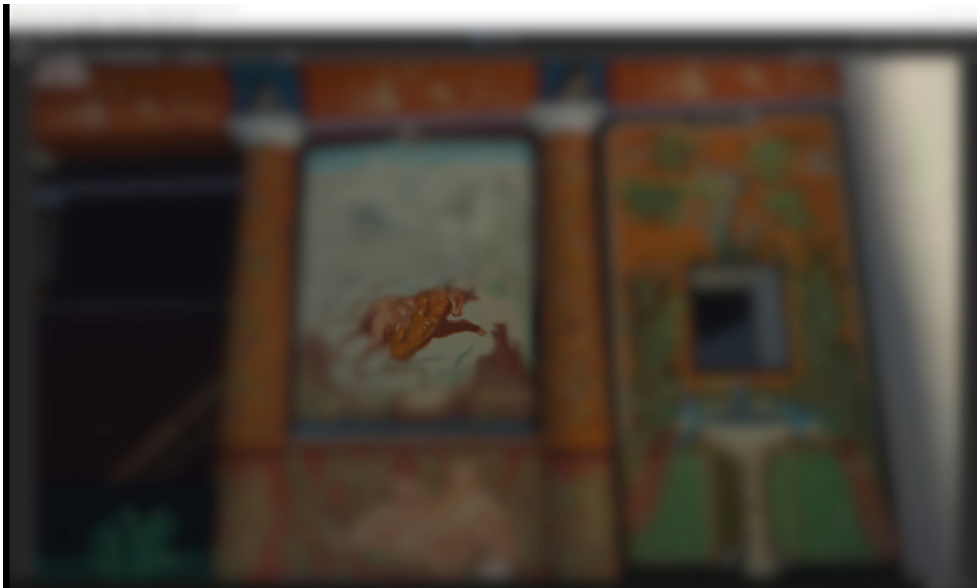
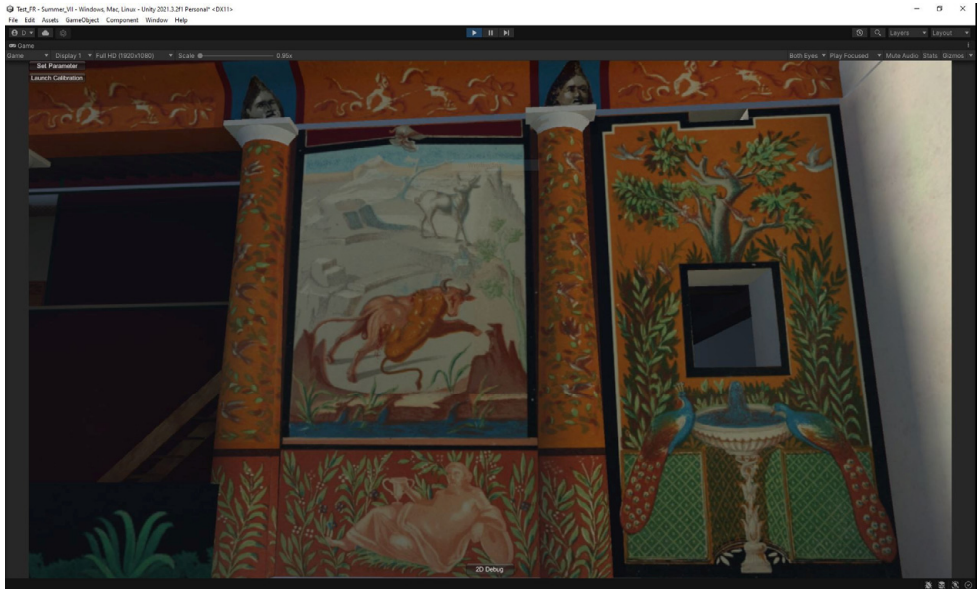


Fig. 7

Reconstruction of the painted east wall in the peristyle (i) of the House of the Greek Epigrams. At the top, rendered image, at the bottom, illustration of the information available to the observer. The difference between an ideal image (at the top) and the information reaching the observer in human vision (at the bottom) is evident. As can be seen, in the latter, the central part is in focus (central vision) while a progressive blurring characterizes the rest of the vision (so-called peripheral vision). Normally we do not perceive this blurring, although it is present.

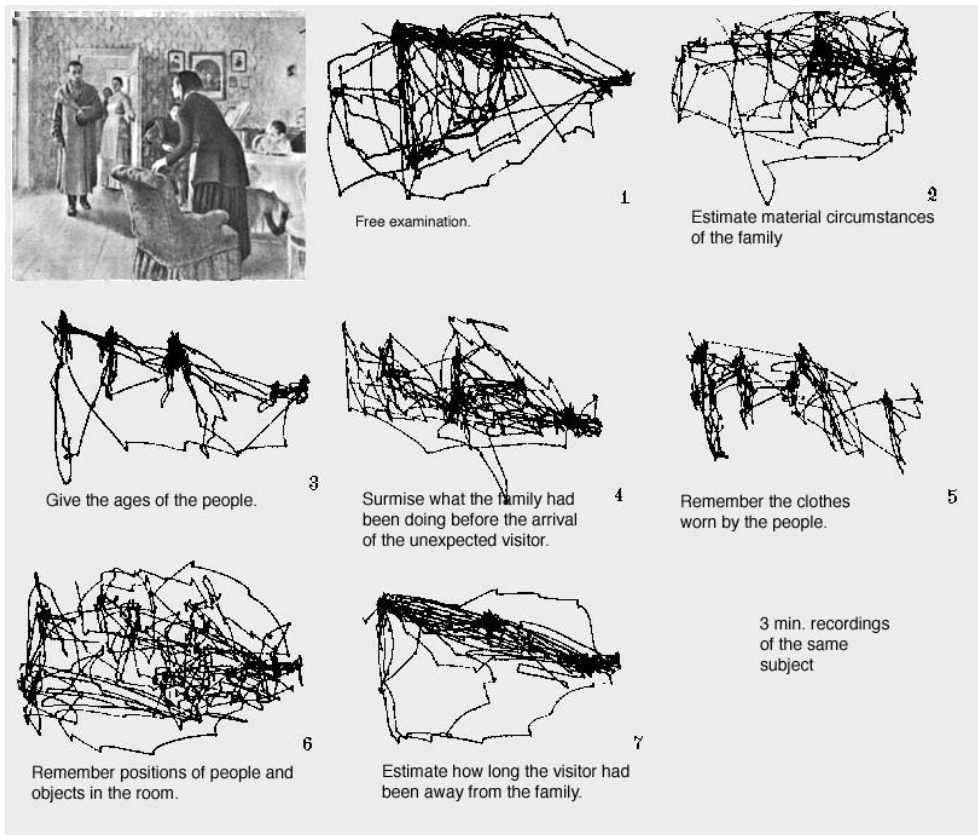


Fig. 8

The task assigned to an observer influences the attentional pattern of the related experience, after Yarbus 1967. Public domain, via Wikimedia Commons.

4 The House of the Greek Epigrams: an annotated chrono-bibliography

The purpose of this section is to give an overview of the scholarly production centred on the House of the Greek Epigrams. Authors, at very different times, have tried to present useful bibliographical lists.¹¹⁷ This section brings together their efforts, updating the results to recent years and offering an annotated presentation of the different entries, without claiming, of course, to be exhaustive.

The House of the Greek Epigrams is positioned on Via del Vesuvio in the northern part of Insula V 1 and measures approximately 650 square metres, which places it among the larger houses in Pompeii. The complex, mostly decorated in the Fourth Style, is named after a small room (y) (2.30 x 2.80 m) with Greek inscriptions preserved beneath four of the five late Second Style paintings (*Fig. 9*).¹¹⁸ The entrance of the house from Via del Vesuvio leads through a corridor (*fauces* a) into a front hall (*atrium* b) equipped with a water basin (*impluvium*), and opening on it several smaller closed rooms (c, d, f), a small corridor (h), and two open front rooms (the *ala* e, and the *tablinum* g).¹¹⁹ From here one enters a large peristyle (i) endowed with a garden (*viridarium*) and three-sided portico with a series of larger rooms opening onto it (m–p) and the already mentioned room with the epigrams (y). A narrow corridor (q) accessible from the northern portico of the peristyle leads to a domestic quarter (r–z) equipped with a *culina* (t) and a *latrina* (z) and the rear entrance V 1,11 opening up towards the Vicolo delle Nozze d'Argento.¹²⁰ During the early period, around the 2nd century BC, the complex was composed of separate units, both built and unexploited, which would become the House of the Greek Epigrams at the time of the late Second-Style decoration of room y (40–30 BC). The last phase of the complex's life, characterized by hasty and haphazard works, probably related to the aftermath of the earthquake(s) preceding the eruption of AD

117 See especially PPM III 1990, 541; n. 2 in Stročka 1995; and n. 3 in Prioux 2011.

118 The texts of the epigrams with commentaries can be found in the *CIL* (IV 3407).

119 The present study acknowledges the recent advances in the reassessment of traditional nomenclature and the troublesome association of a specific label or function with a single room (Leach 1997). Thus, the use of canonical terminology, e.g., *atrium*, *tablinum*, will here have a purely utilitarian purpose as a “convenient categorisation system” (Allison 2008, 271).

120 The entrance V 1,12 leads to a separate upper-floor apartment above the mentioned domestic area.

79, includes minor alterations, the most notable of which is the closing of the southernmost *intercolumnium* of the eastern portico to create room k.¹²¹ First excavated in the years 1875–1876, damaged by Allied bombardment in 1943 and by an earthquake in 1980, it is the only dwelling in the insula that may not have been evacuated before/during the eruption and where many artefacts have been unearthed.

The earliest available documentation for the house is the 19th-century handwritten diaries of the first excavation campaigns¹²² and the *Notamenti* that recorded the transfers of objects found in Pompeii and Herculaneum to the National Archaeological Museum in Naples.¹²³ Immediately following the excavation, Giuseppe Fiorelli described rooms m, n, o, p, and y, mentioning the syrinx found in room o.¹²⁴ He also mentioned one inscription on the west wall of room p (*CIL* IV 4050), one inscribed horse and some names on the south wall of room m (*CIL* IV 4045), and some others inscribed on the north wall of the same room (*CIL* IV 4046), along with the finds from room p. The room with the epigrams (y) was further described by Antonio Sogliano, and more extensively Karl Diltthey after him.¹²⁵ The lithographs produced by Geremia Discanno illustrated the remains of the central wall paintings from the same room.¹²⁶ A thorough report on the excavation of the

121 The organization, architecture, and history of the house are discussed in **Papers II, III, and V** and will therefore not be dealt with in detail here.

122 During the first days of excavation at the site of Pompeii, on 6 April 1748, a wall painting was discovered that, according to the description by Giuseppe Fiorelli (1860, 2), featured two large garlands of fruit leaves and flowers, a very large man's head, an elm, an owl, various birds, and other things ("*dos grandes festones de ojas do frutas y de flores, una caveza de hombre muy grande y de un buen carácter, un elmo, una lechuza, diversos pájaros y otras cosas*"). Three days later this painting was stripped from its wall and four days later it was moved to the Royal Palace of Portici. In more recent times it was identified with the wall painting preserved at MANN with inv. nos. 8525–8526, and was attributed to the upper zone of the south wall of the *tablinum* (g) of the House of the Greek Epigrams (PPM III 1990, 546). This portion of the decoration was missing at the time of the excavation, so its attribution was allegedly based on the analogy with the painted garland preserved on the opposite wall of the same room g (Mau 1877, 23; Sogliano 1879, 63, n. 365; Presuhn 1882, table 19).

In fact, the wall painting described by Fiorelli was not found in the House of the Greek Epigrams but in another area of the same insula (V 1, 29–31) and has been identified with a different item preserved at MANN (inv. no. 8591) (oral communication with Dr Thomas Staub, see also Bragantini & Sampaolo 2009, 125, n. 15).

123 The handwritten documents are held at the Archivio Storico della Soprintendenza di Napoli (ASSAN). For the excavation diaries see *Giornale degli Scavi di Pompei* 1875, ASSAN VIII A3, 5, pp. 29 recto–33 verso; *Giornale degli Scavi di Pompei* 1876, ASSAN VIII A3, 6, pp. 1 recto–7 recto. A slightly less detailed version of the excavation diaries was published in *Giornale degli Scavi di Pompei, Nuova Serie* 3, 1874–1877, 256–257.

124 Fiorelli 1876, 13–15, 27.

125 Sogliano 1876, 29–32; Diltthey 1876a, 294–314; 1876b, 1–16.

126 *Monumenti inediti* (1874–1878), tables 35–36.

house is given by August Mau in 1877.¹²⁷ In 1878 Georg Kaibel described the epigraphic texts of room y.¹²⁸ Emil Presuhn offered a description of the house enriched by the watercolours by Discanno.¹²⁹ In 1879 Mau searched for the inscription discussed by Fiorelli three years earlier (*CIL* IV 4050) and reported an unpublished one (*CIL* IV 4042) found on the south wall of the *tablinum*, g.¹³⁰ Luigi Viola gave an overall description of the house including the service quarter.¹³¹ Sogliano reported all the wall paintings uncovered in the house that had been described by Mau.¹³² Mau, in 1882, described the east wall painting in room y, presenting an illustration and completing it with a very brief discussion about the house and its dating.¹³³ Presuhn discussed the wall paintings from the house, including more watercolours from Discanno.¹³⁴ In 1884, Johannes Overbeck and Mau included the epigrams from room y in their chapter on inscribed evidence in Pompeii.¹³⁵ In 1889 Oskar Bie included the scene depicted in room y in his study on the struggle of Pan and Eros.¹³⁶ In 1890 the third volume by the Niccolini brothers included depictions of the painted walls of room m and room o.¹³⁷ The left side of the wall painting east of the *viridarium* was included in 1896 in the supplement of the Niccolinis' fourth volume.¹³⁸ In 1902 Mau discussed the wall painting on the east wall of room y.¹³⁹ In 1903, he referred again to room y presenting an illustration of the central wall painting on the north wall.¹⁴⁰ In the same volume, Petersen

127 Mau 1877, 18–30; 65–70; 92–99.

128 Kaibel 1878, 498–499, nn. 1103–1106.

129 Presuhn 1878, vol. 2.

130 Mau 1879, 68–69.

131 Viola 1879, 28.

132 Sogliano 1879. The respective numbers are 43, 77, 88, 117, 120–121, 126, 129, 139–140, 142, 150, 170, 178, 193, 197, 230, 237–238, 241–242, 352, 362, 365, 367, 381, 447, 463, 478–483, 485–486, 506, 513, 536, 559, 563, 573, 601, 692, 696–699, 706–707, 709, 716–717, 722, 725, 729–732, 735, 760–762, 781. Interesting here is a depiction of a standing Vesta in the *latrina* (n. 43, p. 16) also reported in the *Corpus* of the *lararia* of Pompeii by George K. Boyce (p. 32, n. 77C, the third of three shrines identified in the so-called service quarter).

133 Mau 1882, 189–196, 239, 254–255, tables 5–6.

134 Presuhn 1882, tables 1–2, 8, 19, 24.

135 Overbeck & Mau 1884, 465–467.

136 Bie 1889, 131.

137 Niccolini & Niccolini 1890, *Arte*, tables 36, 40.

138 Niccolini & Niccolini 1896, table 27

139 Mau 1902, 195ff, fig. 6.

140 Mau 1903, 238–242, fig. 22.

discussed the findings from Mau.¹⁴¹ In 1908, Mau tackled the tripartite nature of the wall painting on the east wall of room y.¹⁴² In 1909 the Greek epigrams found in room y are included in *Corpus Inscriptionum Latinarum* (CIL IV suppl. 2). Gerhart Rodenwaldt touched upon the question of the origin of the wall paintings in room y that he saw as Roman illustrations of the epigrams rather than copies of the Greek originals to which the epigrams referred.¹⁴³ Ernst Diehl reported the Greek epigrams from the house in 1910.¹⁴⁴ In 1916 Johannes Geffcken included the epigrams from room y in his work on commented Greek and Latin texts.¹⁴⁵ In 1922 the repertoire by Salomon Reinach included drawings illustrating the wall paintings from room y.¹⁴⁶ In 1929 Ludwig Curtius focused on the *scaenae frons* painting on the upper part of the north wall painting in room l representing the myth of Alcestis and Admetus.¹⁴⁷ It also presented a rare copy by Discanno of this painting made from an old photograph.¹⁴⁸ In 1930 Marion Elizabeth Blake discussed ornamental thresholds including the mosaic threshold of room y.¹⁴⁹ In 1938 Erich Pernice offered a description of the different pavements of the house and their dating.¹⁵⁰ Beyen briefly referred to the house in the first volume of his study of the Pompeian wall decorations, with illustrations of the central painting on the west wall and the decoration on the east wall of room y.¹⁵¹ In 1944 Christopher M. Dawson discussed in his study of Romano-Campanian mythological landscape painting the *tholos* in the painting of the struggle between Eros and Pan and the sketchy images tending to impressionism in room y.¹⁵² In 1945 Alan M.G. Little hinted at the wall painting in room y while investigating the birth of genuine Roman pictorial art.¹⁵³ In 1949 Reinhard Herbig referred in his monograph to the painting of the dedication of the nets to Pan in room y as an example of allusion to rural Pan sanctuaries.¹⁵⁴ In 1950

141 Petersen 1903, 99, 102.

142 Mau 1908, 482, table 13.

143 Rodenwaldt 1909, 30–32, fig. 4.

144 Diehl 1910, 46–47.

145 Geffcken 1916, 118–124, nn. 295–312.

146 Reinach 1922, 100, figs. 2–3; 101, fig. 5; 260, fig. 2.

147 Curtius 1929, 178, 183.

148 Curtius 1929, fig. 112.

149 Blake 1930, 107, 120, table 28.1.

150 Pernice 1938, 65–66.

151 Beyen 1938a, 52; 1938b, figs. 106, 130.

152 Dawson 1944, 64, 66, 188.

153 Little 1945, 140.

154 Herbig 1949, 24, 40, 45, tables 17.1, 18.1.

Marcello Gigante discussed the dedication of the nets to Pan in room y taken from an epigram (an ἀνάθημα, or votive offering) of Leonidas of Tarentum.¹⁵⁵ In 1952 Karl Schefold mentioned room y discussing the passage from the Second to the Third Style and the self-confident sense of life in the Second Style of painting.¹⁵⁶ In 1954, Schefold referred again to room y as an example of lyrical forms beginning to triumph over epic ones in the late Second Style of painting.¹⁵⁷ He also discussed the female statues flanking the main wall paintings and explained the epigrams as already inscribed on the pictures in the papyrus scroll that served as a model. In 1955 Bernhard Neutsch focused on the room with the epigrams, especially in contrast to what was found by Rodenwaldt before, regarding the pictures represented as echoes of original Greek creations. A brief description of the other rooms of the house was also given.¹⁵⁸ In 1956 Schefold referred to the wall paintings in room y in his contribution to the problem of the origin of landscape painting.¹⁵⁹ In 1957, he offered a very synthetic overview of the paintings of the house room by room.¹⁶⁰ Friedrich Matz presented the decoration in the *tablinum* (g) as an example of the early Imperial period motif of the garland-bearing *erotes*.¹⁶¹ Beyen referred to the wall paintings in room y in 1958.¹⁶² A.G. Woodhead included the epigram on the struggle between Pan and Eros on the west wall of room y in the *Supplementum Epigraphicum Graecum*.¹⁶³ In 1960 the extensive description included in the second volume by Beyen presented an architectural history of the building along with a focus on the room with the epigrams, the *triclinium* m, and the pavements.¹⁶⁴ Mary Lee Thompson discussed the problem of adhering to Neutsch's idea of a unity of the paintings in room y traceable to prototype illustrations.¹⁶⁵ In 1962 Schefold returned to the house and to the wall paintings of the room with the epigrams.¹⁶⁶ In 1963 Peters also focused on the wall painting of room y which are seen as illustrations of the epigrams.¹⁶⁷ In 1965 Matteo Della Corte presented possible

155 Gigante 1950, 132–133.

156 Schefold 1952, 87, 163ff., 196, table 8.

157 Schefold 1954, 217–219.

158 Neutsch 1955.

159 Schefold 1956, 223ff.

160 Schefold 1957, 63–66.

161 Matz 1958, 57, 59–60.

162 Beyen 1958, 315, fig. 4.

163 Woodhead 1958.

164 Beyen 1960, 199–233, figs. 85–88, 92a.

165 Thompson 1960, 105–106, 204–205.

166 Schefold 1962, 9, 45–47, 124, 138, 143, 163, figs. 25, 105.2, 148.3, 159.1, 179.

167 Peters 1963, 26–27, 64.

connections between inscriptions and inhabitants of the house.¹⁶⁸ Gisela M.A. Richter discussed the presence of Homer in the wall painting of the north wall of room y in her work on Greek portraiture.¹⁶⁹ In 1974 Agnes Allroggen-Bedel analysed the decorated architecture in room y and its space-creating function.¹⁷⁰ In 1975 Paavo Castrén listed the inscription found on a signet ring in the house “*L. Val(erius) F(laccus)*” (*CIL* X 8058, 89) among those testifying to the presence of the *Valerii* in Pompeii.¹⁷¹ In 1976, the archaeological guide by Eugenio La Rocca *et al.* featured an entry on the house.¹⁷² In 1977 Andreas Schmidt-Colinet mentioned the east wall of room y while discussing Dionysian figures.¹⁷³ In 1979 Gigante focused on the textual aspects of the epigrams in room y and briefly on the myth of Alcestis and Admetus in room l.¹⁷⁴ In 1980 Dorothea Michel discussed the wall painting in the *viridarium*.¹⁷⁵ In 1981 Bragantini *et al.* reported the available repertory numbers of the photographs of the house in the Gabinetto Fotografico Nazionale.¹⁷⁶ Eleanor Winsor Leach investigated the myth of Acteon, mentioning its presence in the house (on the west wall of room p) as an example of Third Style painting including the grotto motif.¹⁷⁷ Susan Rose Silberberg included the room with the epigrams in her corpus of sacro-idyllic landscape paintings in Roman art.¹⁷⁸ In 1982 Arnold and Mariette De Vos presented the house very briefly in their guide, focusing on the epigram room.¹⁷⁹ Leach presented the room with the epigrams as an example of a “portico style” decorated reading room.¹⁸⁰ In 1986 Nicole Blanc and Francoise Gury briefly described the struggle between Pan and Eros in the relative section of the lexicon, including bibliographical information.¹⁸¹ Vander Poel *et al.* provided indices, concordances, a bibliography, and an updated plan for the entire

168 Della Corte 1965, 98–99, 470 n. 93. He had already touched on this topic in the first edition (1926, 74–75).

169 Richter 1965, 55.

170 Allroggen-Bedel 1974, 24–26.

171 Castrén 1975, 233.

172 La Rocca *et al.* 1976, 311.

173 Schmidt-Colinet 1977, 146, 267, fig. P4.

174 Gigante 1979, 71–75, 126.

175 Michel 1980, 397–398, table 74.2.

176 Bragantini *et al.* 1981, 10–15.

177 Leach 1981, 312, 314, n. 26, no. 6.

178 Silberberg 1981, cat. 12, fig. 10.

179 De Vos & De Vos 1982, 210.

180 Leach 1982, 158 ff., fig. 8.

181 Blanc & Gury 1986, 984, n. 239.

insula and thus for the house.¹⁸² In the chapter about landscape and myth, Erika Simon discussed the painting depicting the discovery of Danae and her infant son Perseus by fishermen from the island of Seriphos (room o) among the myths appearing in the pictorial genre which are predominantly Greek.¹⁸³ In 1987 Charlotte R. Long briefly included the medallions depicting gods in the *atrium* (b) in her study.¹⁸⁴ Ehrhardt discussed the spatial effect of the aedicule in room y.¹⁸⁵ In 1988 Gigante dwelt on the love of Leonidas of Tarentum for craft shown in the epigrams that can be found depicted in room y (dedication of the nets to Pan).¹⁸⁶ Again Gigante associated the decoration of room y with a *Bilderbuch*, or illustrated papyrus used as a model.¹⁸⁷ Eric M. Moormann discussed the house as an example of phase II of the Second Style of painting, and also the female figures in room y, the bronze winged figure crowning the architectural decoration, the reclining Silenus in the wall decoration east of the *viridarium* (i), and the spying (*aposkopon*) Pan and Poseidon executed according to the canon of Lysippus in room y.¹⁸⁸ He also described more extensively the wall decorations east of the *viridarium* and in room y.¹⁸⁹ In 1989 Baldassarre Conticello included an entry on the painting on the north wall of the room depicting Homer and the fishermen.¹⁹⁰ He provided a description, dating, and reference bibliography in both Italian and German. Leach described room y as a gallery room and the paintings as a clear example of illustrative art not drawn from pre-existing models.¹⁹¹ Discussing Vitruvius on wall paintings, Rolf Albert Tybout presented room y as an example where *deorum simulacra* do not require a particularly large wall surface and as a term of reference when examining the Second Style examples outside Italy.¹⁹² Again, he referred to room y regarding the use of *monopteros* as an individual element of the central painting.¹⁹³ In 1991 Mariette De Vos curated an entry in the series *Pompei: pitture e mosaici* with extensive descriptions, bibliographical information, and illustrations of the house

182 Vander Poel *et al.* 1986, 70–71.

183 Simon 1986, 203, fig. 257.

184 Long 1987, 347.

185 Ehrhardt 1987, 18, 25, 27.

186 Gigante 1988, 26–27.

187 Gigante 1988, 32–33.

188 Moormann 1988, 4, 16, 45, 54–56, 64, 74.

189 Moormann 1988, 162–164.

190 Conticello 1989, 129–131, 262.

191 Leach 1988, 219–222, fig. 8.

192 Tybout 1989, 100, 166.

193 Tybout 1989, 315.

and its decorations.¹⁹⁴ In 1993 the volumes by Giuseppina Cerulli Irelli *et al.* presented an entry dedicated to the wall paintings in room y and the painting of Mars and Venus in room o.¹⁹⁵ Hans Eschebach *et al.* presented in their list of buildings and map of the ancient city of Pompeii a condensed entry on the house building phases, decoration, finds, and literature.¹⁹⁶ In 1995, Volker Strocka provided full documentation and publication of the wall paintings of the room with the epigrams, including black and white reconstruction drawings of the walls, the placement of the room in its functional context, and a full exploration of its pictorial programme.¹⁹⁷ In 1996 Gemma C.M. Jansen investigated the water system in the house with a metal detector.¹⁹⁸ In 1997 Arwed Arnulf maintained that the epigrams described the action depicted and anticipated the outcome of the action in the form of a sentence.¹⁹⁹ In 1998 Chaniotis *et al.* included a new entry on the epigrams in the *Supplementum Epigraphicum Graecum*.²⁰⁰ That same year Kathryn Gutzwiller discussed the inscriptions from room y as an example of epigrams composed for a book and moved to an epigraphical context.²⁰¹ In 2005, Margareta Staub Gierow presented some interim results from the study, analysis, and documentation of the house as part of the Swedish Pompeii Project.²⁰² In 2006 Laura Caso discussed the presence of Dionysus in room y.²⁰³ Ernesto De Carolis described the silverware found in the house in the volume by Pier Giovanni Guzzo.²⁰⁴ García y García reported the damage suffered by the *fauces* of the house as a result of the bombing in 1943.²⁰⁵ In 2007 Bettina Bergmann proposed a novel investigation of the overall pictorial framework of the room with the epigrams.²⁰⁶ Mark Robinson discussed the results from the excavation of the peristyle garden (i) concerning the development and previous use of the area.²⁰⁷ Staub Gierow presented a preliminary report on the

194 PPM III 1990, 539–573.

195 Cerulli Irelli *et al.* 1993, 85–87.

196 Eschebach *et al.* 1993, 1215–126.

197 Strocka 1995.

198 Jansen 1996, 48 n. 2.

199 Arnulf 1997, 38–40.

200 Chaniotis *et al.* 1998.

201 Gutzwiller 1998, 230–231.

202 Staub Gierow 2005.

203 Caso 2006.

204 De Carolis 2006.

205 García y García 2006, 61–62.

206 Bergmann 2007.

207 Robinson 2007.

results of the fieldwork carried out in 2000–2004 with additional observations from the 2005 campaign.²⁰⁸ In 2008 Staub Gierow presented new evidence concerning fieldwork carried out in the house in 2004–2006.²⁰⁹ In the same year, the database of results of the insula documentation and study campaigns by the Swedish Pompeii Project were published in open access as a website which is continually updated. Katharina Lorenz mentioned the house in relation to the myth of abandoned Ariadne, Venus uncovered, and the *erotes* playing with the different attributes, and Danae holding Perseus, all included in room o.²¹⁰ Lorenz also presented a useful concordance compiling the basic information on the wall paintings discussed in the study on the mythological images.²¹¹ Robinson investigated the stratigraphy below the AD 79 level.²¹² In 2009, Domenico Esposito discussed room y as indicating the housemaster possessing a great knowledge of Greek culture,²¹³ and Thomas Staub discussed the use of different types of thresholds in the house.²¹⁴ From 2010 onwards, the building history of the house was tackled in the comprehensive study of the whole Insula V 1 by the team of the Swedish Pompeii Project.²¹⁵ In 2010 Simona Antolini analysed the epigrams of room y as part of a small dossier of Greek inscriptions in the Latin-speaking western area of the Roman Empire.²¹⁶ In 2011 Évelyne Prioux arrived at similar conclusions as Bergmann in 2007, conceiving the decorative ensemble as a triple collection of paintings, statues, and epigrams.²¹⁷ In 2012, Agneta Freccero discussed the plasters in the house.²¹⁸ Michael Squire presented his interpretation of the icono-textual complexity of room y, with poems and paintings functioning as a stimulus for erudite discussion.²¹⁹ In 2015 Richard Olsson discussed the water system in the house as part of a comprehensive study on the entire insula.²²⁰ In 2016, Staub and Saverio De Rosa presented the monetary

208 Staub Gierow 2007.

209 Staub Gierow 2008.

210 Lorenz 2008, 105, 160–161.

211 Lorenz 2008, 541–543, K15.

212 Robinson 2008, 126–128.

213 Esposito 2009, 61–62.

214 Staub 2009, 216–217.

215 Leander Touati 2010; Leander Touati *et al.* 2018; 2021.

216 Antolini 2010, 259–265.

217 Prioux 2011.

218 Freccero 2012, 68–71.

219 Squire 2012.

220 Olsson 2015, 75, 79, 104.

discoveries from the excavations of Regio V, 1 and thus from the house.²²¹ In 2019 Robinson described the results of the investigations conducted from 2004–2006 in the peristyle garden (i) with a focus on the role Roman gardens played in domestic religion.²²² In 2023 Eva Rystedt discussed room y in her chapter about Roman painting, identifying both words and images as a way to announce a share from the owner of the house in the cultural capital represented.²²³

221 Staub & De Rosa 2016, 50, 53–54, 90.

222 Robinson 2019, 230–243.

223 Rystedt 2023, 80, 98–100.



Fig. 9

House of the Greek Epigrams, wall paintings in room y, photomontage of the panels. From left to right: west wall (the struggle of Pan and Eros at the presence of Aphrodite), north wall (dedication of the nets to Pan, Homer's riddle, the nibbling goat), east wall (the golden Bacchus), south wall: view out to the peristyle. Photograph: Hans Thorwid, adapted by permission of the Swedish Pompeii Project.

5 Reconstructing the House of the Greek Epigrams

A key step in this research was the reconstruction of the House of the Greek Epigrams as it may have appeared before the eruption of AD 79 (*Figs. 10–12*).²²⁴ As it became evident, the analyses presented in this volume would have been unfeasible without the production of this reconstructive model. This is because the physical remains from Pompeii are, despite their level of preservation, fragmentary, as it is always the case in archaeology. A relevant aspect, often forgotten, is that behind the appearance of a site producing a large quantity of spectacularly well-preserved artefacts and structures, Pompeii has undergone several phases of disruption. The once-popular trope of a “moment frozen in time” has in fact no basis. As scholars have ascertained, this site has been characterized by a series of post-eruption disturbances and a complex building history, making Pompeii more like a convoluted palimpsest than a frozen moment in time.²²⁵ The alleged “freeze-frame” of a Roman city is, rather, a swarming of different cultures overlapping and influencing each other (Oscan, Etruscan, Samnite, Greek, and Roman) so that its identity lies precisely in its ability to connect all these different layers together.²²⁶ One or more earthquakes preceding the fatal volcanic event had already shaken the Pompeian society to its base and perhaps determined a new social structure with the emergence of new merchant classes.²²⁷ In the aftermath of the eruption, rescue operations were organized by the emperor Titus, which likely came to a complete halt in AD 80 when a great fire devastated Rome.²²⁸ The first Bourbon excavators tunnelling the buildings from the streets testified to the passage of ancient

224 The reconstructive model of the house can be accessed at https://models.darklab.lu.se/Pompeii/EpigrammiGreci/3D_Reconstruction/.

225 Allison 2004.

226 Strabo recounted how Herculaneum and Pompeii were marked by a series of waves of domination: Oscans, then the Tyrrhenians and Pelasgians, and after that the Samnites; interpreted in the sequence as Oscan, Etruscan, Samnite (5.4.8). On the topic, see also Wallace-Hadrill 2013.

227 Tacitus mentions one that occurred at the end of AD 62 (*Ann.* 15.22.2), Seneca another on 5 February AD 63 (*Nat.* 6.1.2). For the debate concerning the dating see Wallace-Hadrill 2003 and Hine 1984. For the social change in connection with the earthquake of AD 62, see Laurence 2006, 5.

228 Suet. *Tit.* 8.91; Dio Cass. 66.24.3–4.

scavengers who had already plundered the site. Over the years, several excavation campaigns followed, each bringing a different sensitivity to the treatment of the physical remains.²²⁹ deliberate destruction of seemingly uninteresting pieces in the initial period of the site's discovery (far removed from the scrupulous attention to the tiniest traces of modern excavators), the bombing in 1943, the more recent earthquake of 1980, natural and anthropogenic degradation, all contributed to the change, generating an enormous distance from the condition of the frozen moment in time.²³⁰

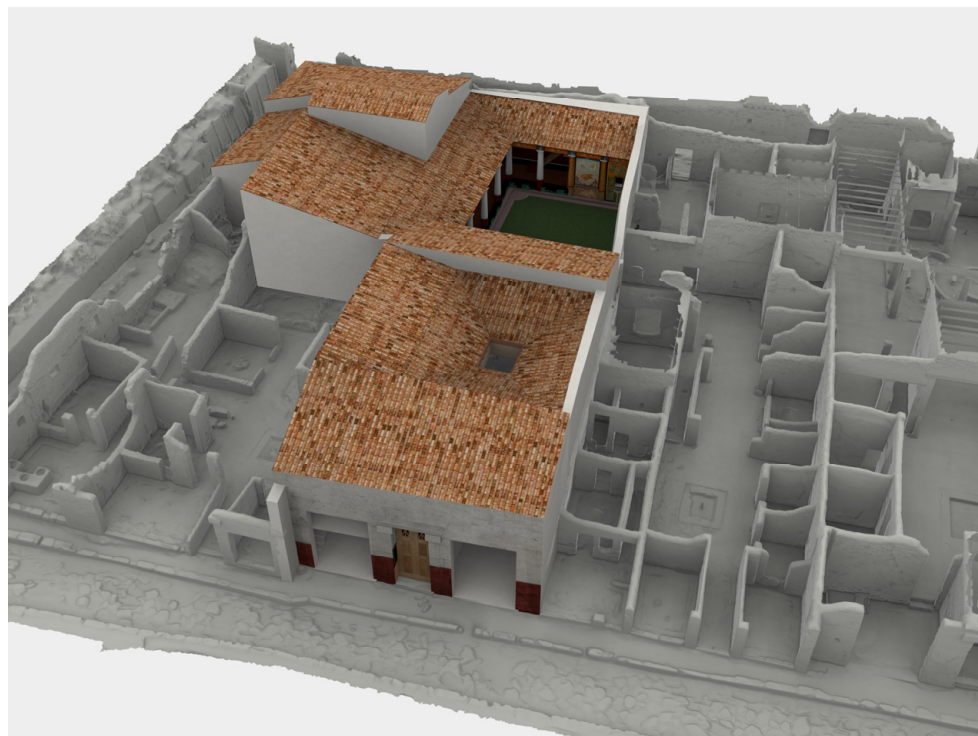


Fig. 10

3D Reconstructive model of the House of the Greek Epigrams, in the context of the reality-based 3D model of the physical remains of the insula.

Despite the difficulty of dealing with such a fragmentary palimpsest, do we still really need a reconstructive model for the analyses conducted here? Examining a wall painting under different light conditions would still be possible, limited to those cases in which parts of decoration have been well preserved. Nevertheless, the

229 De Caro 2015; Foss 2008.

230 See García y García 2006 for a thorough documentation of the bomb damage to the site.

amount and the quality of light within one space are holistically determined. They cannot discount the contribution of the other rooms of the house, their ceilings, and floors, their decorations, and their different coefficient of reflectivity. Modern temporary or more stable roofs, often imitating the impluviate shape of *atria tuscanica*, are placed at heights dictated by convenience, not reflecting any attempt to reconstruct the possible height of the space they cover. Even conceding that a patchy roofscape exists—with the above caveat—for the House of the Greek Epigrams, most of the wall plasters would still be missing. One might, for example, think about the roof over the peristyle. The light that brushes the wall paintings in the room with the epigrams (y) today is very different from the subdued light transformed by the peristyle roof. To complicate the picture is the necessity to quantify the phenomenological experience and to measure the quantity of light entering and being reflected by the different spaces. In addition to this, one must add the fact that solar co-ordinates change over time, so this requires additional reconstructive effort, just as the photometric characteristics of ancient artificial lights must be reconstructed.²³¹

231 The lamps found in the house are listed in *Table 1*. This includes the number of inventories, the references for the excavation report (*Giornale degli Scavi di Pompei, Nuova Serie 3*), and the records of their transfer from Pompeii to the National Archaeological Museum in Naples (*Notamenti*) when available, and typological concordances.



Fig. 11

House of the Greek Epigrams, view from *atrium* (b) towards the peristyle (i). At the top, the reality-based 3D model, at the bottom, the 3D reconstructive model.



Fig. 12

House of the Greek Epigrams, view from *tablinum* (g) towards the *viridarium* (i). At the top, the reality-based 3D model, at the bottom, the 3D reconstructive model.

Table 1

Lamps found in the House of the Greek Epigrams. The table includes the inventory number at the National Archaeological Museum of Naples (MANN), references to the excavation diary (*Giornale degli Scavi di Pompei*), the room where the lamp was found, the material, the record of the transfer from Pompeii to the MANN (*Notamenti*) when available, typological concordances, and the related references.

Inv. no.	Giornale degli scavi	Room	Material	Notamenti	Type	Reference
111009	16 Nov 1875	b	Bronze	03 Nov 1876 no. 75	Loeschcke type a	Valenza Mele 1981, 145, Cat. no. 334
116753	17 Nov 1875	c	Terracotta	08 Jan 1888 no. 244	Dressel 20; Loeschcke VIII L 2; Lerat 3° serie B; Ponsich III B1; Deneauve VII A; Bisi Ingrassia IX G; Bailey O III; Di Filippo Balestrazzi B.II.h.4	Caputo & Tamburrelli 2007
116754	17 Nov 1875	c	Terracotta	08 Jan 1888 no. 245	Dressel 20; Loeschcke VIII L1; Lerat 3° serie B; Ponsich III B1; Deneauve VII A; Bisi Ingrassia IX F; Bailey P; Di Filippo Balestrazzi B.II.h.5	Caputo & Tamburrelli 2007
116755	17 Nov 1875	c	Terracotta	08 Jan 888 no. 246	Dressel 24; Loeschcke VIII R; Lerat 3° serie a; Ponsich III B2; Deneauve VII A; Bisi Ingrassia IX H; Bailey O V; Di Filippo Balestrazzi B.II.5.6	Caputo & Tamburrelli 2007
116835	17 Nov 1875	c	Terracotta	08 Jan 1888 no. 326	Dressel 24; Loeschcke VIII R; Lerat 3° serie A; Ponsich III B2; Deneauve VII A; Bisi Ingrassia IX H; Bailey O V; Di Filippo Balestrazzi B.II.5.6	Caputo & Tamburrelli 2007
116836	17 Nov 1875	c	Terracotta	08 Jan 1888 no. 327	Dressel 20; Loeschcke VIII L 2; Lerat 3° serie B; Ponsich III B1; Deneauve VII A; Bisi Ingrassia IX G; Bailey O III; Di Filippo Balestrazzi B.II.h.4	Caputo & Tamburrelli 2007
Not identified	17 Nov 1875	c	Terracotta	---	---	---
111220	9 Feb 1876	q	Bronze	20 Nov 1877 no. 6	Loeschcke type a	Valenza Mele 1981, 65, Cat. no. 141
Not identified	9 Feb 1876	q	Terracotta	---	---	---

5.1 Sources

Bridging the gaps is the major issue when attempting the reconstruction of cultural heritage, as we have seen. The way specialists tackle this question is of some importance, and the entire process should be clearly explained to allow the users (public or other scholars) to evaluate the level of uncertainty that lies beyond those very virtual structures. This has led over time to initiatives that have tried to clarify this issue and the development of solutions to clearly specify the different choices and the motivations underpinning each reconstructed piece of the puzzle.²³² One important question that this research wanted to investigate is the inferential process that guides our choices. How do we combine our sources to fill the gaps? How do we decide which solution is better than the other? This topic has been treated in section 2.1 and explored in **Papers I** and **II** and will therefore not be discussed here. Another important issue is how we can make explicitly clear the level of reliability of our virtual structures. This is discussed in section 5.3.

What sources are available to create a reconstructive model of a Pompeian house? For the specific case in point, I have considered:

- 1) Physical remains
- 2) Testimonies (cork model, archaeological reports, reproductions)
- 3) Consistency (e.g., with roofs, second floors)
- 4) Comparanda (physical remains of other houses)
- 5) Ancient literary sources on building practices

5.1.1 Physical remains

The direct examination of the material remains of the house naturally constitutes the first and most important source of information. An ad hoc campaign I conducted for the precise purpose of this study, described below, allowed me to gain first-hand knowledge of the structures and build the basis for a critical reconstruction of the house. This included digital documentation of the structures, as a complement to a previous campaign conducted by the Swedish Pompeii Project, and acted as the necessary completion to the primary value of the autopsy of the material remains.

232 Initiatives such as the London Charter (<http://www.londoncharter.org/>) and the Sevilla Principles (<http://sevilleprinciples.com/>) have dedicated specific measures in response to this problem. According to the Principle 3 of the London Charter: “in order to ensure the intellectual integrity of computer-based visualisation methods and outcomes, relevant research sources should be identified and evaluated in a structured and documented way”. In this regard, scholars have stressed the importance of documenting the entire reconstructive process and making clear the different choices made during the process of reconstruction (Demetrescu 2015, Demetrescu *et al.* 2016, Demetrescu & Fanini 2017, Demetrescu 2018), and the related levels of consistency (Dell’Unto *et al.* 2013) putting the accent on the reasoning process or “knowledge provenance” (Bruseker *et al.* 2015).

The physical remains of the House of the Greek Epigrams were documented through several campaigns in the framework of the Swedish Pompeii Project.²³³ The first extensive photographic campaign was conducted from 2005–2014 by team photographer Hans Thorwid, approaching the preserved structures wall by wall, room by room. In 2008, the results of the documentation and study campaigns of the insula were published on a continually updated open access web platform.²³⁴ During two campaigns in 2011–2012, a 3D acquisition of the entire insula was carried out and a 3D model of the city block was generated as a final product. Colour information was transferred from the undistorted photographs produced during the first campaign to some of the reality-based models of the house.²³⁵ Through a new photographic campaign conducted with the use of drones, it was possible to assure the necessary accuracy of the reconstruction of the top parts of the walls and semi-automatically transfer colour information to the model using photogrammetric techniques (*Fig. 13*). This granted a general chromatic aspect to the models of the buildings composing the city block. The models were subsequently imported into the Swedish Pompeii Project online platform and made freely available.²³⁶ A new photographic campaign was conducted as part of the present research to transfer high-quality colour information to the reality-based model of the house. Some 9,000 pictures were taken from the ground and transferred using photogrammetric techniques and taking advantage of the high-performance computational resources available through the Lund University Centre for Scientific and Technical Computing (LUNARC) (*Fig. 14*).²³⁷ This allowed a secure base for building the 3D reconstruction of the house with all the necessary chromatic and topological information in high resolution (*Fig. 15*, see also *Figs. 11–12*).

233 See Leander Touati *et al.* (2021, 181–186) for a thorough account of the Swedish Pompeii Project fieldwork organization. Physical remains also include decorative elements such as the portions of wall paintings stripped from the north wall of room o and housed at the National Archaeological Museum in Naples (heron and cobra, inv. no. 110876; a heron pecking a lizard seen in profile to the left, and a white dog crouched to the right in front of a bush, inv. no. 110877; *symplegma* of Satyr and Maenad or Hermaphrodite, inv. no. 110878).

234 <https://www.pompeijiprojektet.se/>.

235 For the methodology used, see Dell’Unto *et al.* 2013. On the difference between the interpretative model and the reality-based model, Dell’unto and Landeschi (2022, 20) specify that “the former refers to hypothetical reconstructions of how a specific object (e.g., a monument, an artefact or a site) might have looked like in the past. The latter instead refers to 3D representations which display the object as it is at the moment of data acquisition”.

236 The models can be accessed at <https://www.pompeijiprojektet.se/modelmeasuring.php> and <https://www.darklab.lu.se/digital-collections/monuments/pompei-insula-v-1/#c285857>.

237 The software used was Metashape (<https://www.agisoft.com/>).

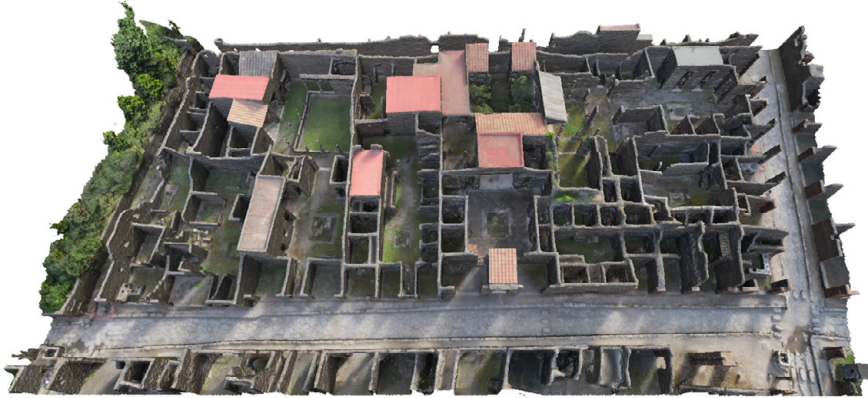


Fig. 13

Reality-based 3D model of Insula V 1. Courtesy of the Humanities Laboratory (HUMLab), the Institute of Archaeology and Ancient History, the Lund University Digital Archaeology Laboratory (DARKLab) at Lund University, and the Institute of Information Science and Technologies "Alessandro Faedo" (ISTI) at the National Research Council of Italy (CNR), Pisa.

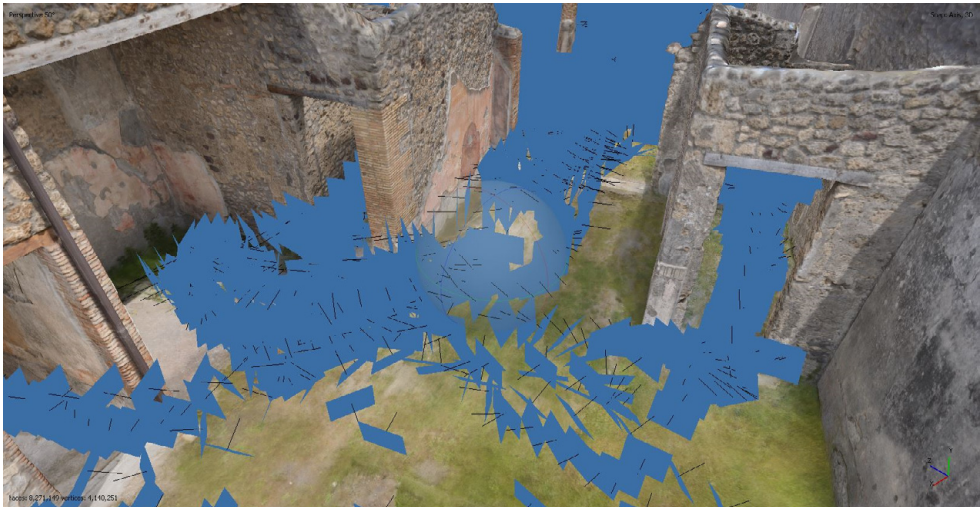


Fig. 14

Reality-based 3D model of the House of the Greek Epigrams built using photogrammetric techniques. The image shows a portion of the model with the photogrammetric points highlighted.



Fig. 15

Reality-based 3D model of the House of the Greek Epigrams. The colour information from the images was superimposed on a previous model created by means of a laser scanner documentation campaign.

5.1.2 Testimonies

Testimonies are all those types of sources that document parts of the building that are no longer completely visible (e.g., wall paintings) or have completely disappeared. This information can be found in physical models, as in the case of the famous cork model of Pompeii, or archival information, such as legacy data from an excavation report or reproduction of wall decoration produced by scholars in the 19th century, or photographic documentation.²³⁸

5.1.2.1 Cork model

The cork model of Pompeii, commissioned by Giuseppe Fiorelli, who was appointed director of the excavations in 1861, is exhibited in the National Archaeological Museum in Naples (*Fig. 16*). Built by Felice Padiglione and painted by Antonio Servillo but then completed in several stages over decades, it reproduces on a scale of 1:100 with millimetric precision the state of the physical remains of the site brought to light in the years between 1860 and 1940.²³⁹ The information stored in the physical model of Pompeii has often proved a valuable source for

²³⁸ It is interesting to note that the physical reality of archaeological sites is constantly in transformation, so that, for example, recent documentation of a structure that suddenly collapses might automatically be transformed into a testimony.

²³⁹ Cabezos Bernal & Rossi 2017.

scholars who want to try their hand at reconstructing Pompeii's buildings. Of course, the size of the model, which occupies 25 square metres of the museum room named after it, makes it difficult for scholars to go beyond a simple visual appreciation. Measurements would be needed to reconstruct the architectural and decorative elements, and these are hard to access. Fortuitously, the portion of the model that includes Insula V 1, to which the house belongs, lies at the edge of the model (*Figs. 16–17*). Even so, this did not allow direct measurements to be taken, but did permit the application of photogrammetric techniques to survey the house in 3D. A series of pictures were taken, using a tripod and a zoom lens, due to the size of the model. Before proceeding, special markers were placed on the portion of the scene to be reconstructed, to help then scale and position the relevant 3D geometry correctly once generated. This led to the production of a 3D model with colour information (textures) that allowed the direct measurement of parts (decorations, reliefs) of the architectural ensemble that have now disappeared but that existed at the time of the excavation (*Fig. 18*).

It must be remembered that, despite the opportunities offered by new technologies and the possibility of taking photographs with a zoom lens, due to the sheer size of the cork model itself, some parts are likely to be obscured when the observer stands in a particular position that does not allow all features to be ascertained. In this case, archaeological reports provide crucial information regarding aspects that are difficult to detect in the cork model.



Fig. 16

Top view of the cork model of Pompeii in the National Archaeological Museum of Naples (MANN). The outline in red highlights Insula V 1. Photograph: author. By courtesy of Ministero della Cultura – Museo Archeologico Nazionale di Napoli.



Fig. 17

Detail of the cork model of Pompeii showing Insula V 1. Photograph: author. By courtesy of Ministero della Cultura – Museo Archeologico Nazionale di Napoli.

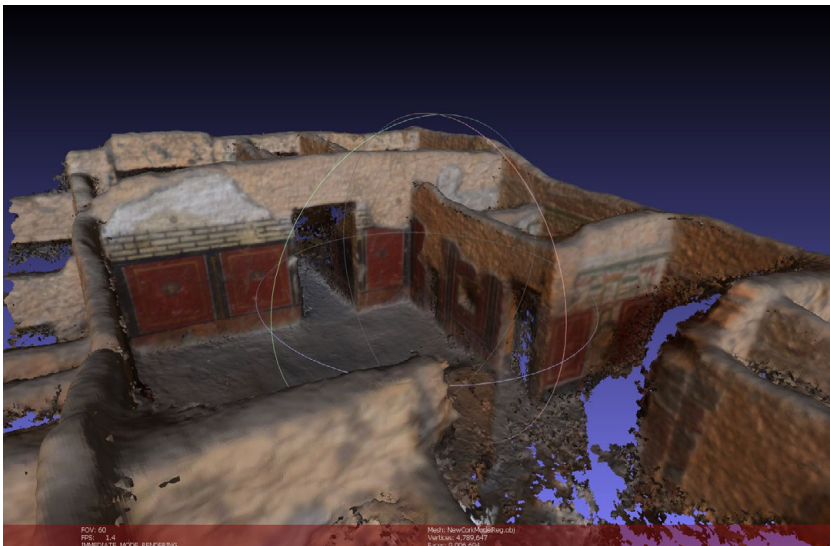


Fig. 18

Reality based 3D model of the portion of the cork model of Pompeii relating to the House of the Greek Epigrams.

5.1.2.2 Archaeological reports

Excavation reports by 19th- and 20th-century scholars are another valuable source of information to mitigate the uncertainties resulting from many decorative elements having been lost, overgrown by vegetation, or simply faded over the years due to weathering. In the specific case of the House of the Greek Epigrams, these are the reports from scholars such as Giuseppe Fiorelli, Luigi Viola, Karl Diltthey, and August Mau.²⁴⁰ In particular, the report curated by Mau and included in the *Bullettino dell' Instituto di Corrispondenza Archeologica* was a valuable source due to its very detailed descriptions and measurements.²⁴¹

5.1.2.3 Photographs

Another very important source of information is the photographic documentation, not only as a record of the vanishing evidence due to the natural degradation of the structures and decorations exposed to the elements, but also of the abrupt changes that resulted from the bombing in 1943. The effects of this latter event were particularly devastating for the entire site, and the House of the Greek Epigrams was not spared. García y García has offered a description of the damage suffered by the house on 16 September 1943, mainly involving the *fauces* and the flanking *tabernae* (V 1 17 and 19).²⁴² To this information, Strocka added, on the basis of investigations made using the photographic documentation prior to the bombing, that the room with the epigrams had also been damaged.²⁴³ Bragantini *et al.* included all the repertory numbers of photographs of the house from the Gabinetto Fotografico Nazionale in their series *Pitture e pavimenti di Pompei*.²⁴⁴

5.1.2.4 Reproductions

Visual reproductions made using a variety of techniques are the perfect complement to the cork model and the archaeological reports. In the case of the House of the Greek Epigrams, these included:

- Drawings of the painted medallions with bust of gods in the *atrium* (b) signed by Sogliano; watercolours of the vignettes from room d, the *ala* (e), the *tablinum* (g), and room l; drawings of the central paintings on the north (Mars and Venus) and west (Danae holding Perseus) walls of the *exedra* (o)

240 See section 4 for an annotated chrono-bibliography of these contributions.

241 Mau 1877, 18–30, 65–70, 92–99.

242 García y García 2006, 61–62.

243 Strocka 1995, 275, 277.

244 Bragantini *et al.* 1981, 10–15.

- signed by Discanno; watercolour of the central wall painting (Homer's riddle) on the north wall of room y.²⁴⁵
- Lithographs by Discanno reproducing the central paintings of the room with the epigrams (y).²⁴⁶
 - Reproductions by the architect August Sikkard included in the work by August Mau.²⁴⁷ These consisted of a sepia-colour depiction of the decoration of the east wall in the room with the epigrams (y), and full-colour detail of part of it.
 - Watercolours by Geremia Discanno illustrating the study by Emil Presuhn.²⁴⁸ These reproduced: the painted wall east of the *viridarium* (i) (Fig. 19), the colourful pavements of the *fauces* (a) and the *tablinum* (g), strips of the decorations of the antechamber in the *triclinium* (m) and in the *atrium* (b) (Fig. 20), vignettes from room d and the *ala* (e), part of the decorated wall in room l, the *cocciopesto* floor decorated with *tesserae* in room n, the central paintings on the north (Mars and Venus) and east (Ariadne abandoned by Theseus) walls of the *exedra* (o), the decorations of the main chamber of the *triclinium* (m), and the garland decorating the upper part of the north wall of the *tablinum* (g).
 - Reproductions by the Niccolini brothers. These included: a sepia-colour reproduction of the decoration of the north wall of the chamber of the *triclinium* (m) and a coloured depiction of the decoration of the north wall of the *exedra* (o),²⁴⁹ and the left part of the wall painting on the east wall of the *viridarium* (i).²⁵⁰
 - Reproductions included in a work by Mau of the central wall painting on the north wall of room y.²⁵¹
 - Drawings by Jeanne Evrard of the central wall paintings in room y included in the repertoire by Salomon Reinach.²⁵²

245 *Wandmalerei, 2. Pompeji (I)*, nn. 83.22–83.35.

246 *Monumenti inediti* (1874–1878), tables 35–36.

247 Mau 1882, tables 5–6.

248 Presuhn 1878, vol. 2; 1882, tables 1–2, 8, 19, 24.

249 Niccolini & Niccolini 1890, tables 36, 40.

250 Niccolini & Niccolini 1896, table 27.

251 Mau 1903, fig. 22.

252 Reinach 1922, 100–101, 260, figs. 2–3, 5.

- A copy (from an old photograph) by Discanno of the *scaenae frons* painting in the upper part of the north wall in room I representing the myth of Alcestis and Admetus.²⁵³
- Black-and-white reconstruction drawings of the decorations of the room with the epigrams (y) by Strocka.²⁵⁴



Fig. 19

Reproduction of the wall painting on the eastern side of the portico of the peristyle (i), after Presuhn 1882, table II. <https://doi.org/10.11588/diglit.58947#0048>

253 Curtius 1929, fig. 112.

254 Strocka 1995.



Fig. 20

Reproduction of details of the decorations of the *triclinium* (m) and the *atrium* (b), after Presuhn 1882, table IV. <https://doi.org/10.11588/diglit.58947#0050>

5.1.3 Consistency

The three-dimensional reconstructive model was built in stages, starting with the general and then moving on to the particular, through successive refinements, focusing on different areas and sometimes on one room or one specific element at a time, as the case required. Within this process, great importance is attached to

comparing the individual parts with each other to ensure consistency. This may mean, for example, verifying that the slope of a roof is compatible with, for example, the presence of a door and other roofs and that in their entirety they do not generate bizarre solutions that can lead to technical problems, such as, for example, with water drainage.

5.1.4 Comparanda

Despite the apparent abundance of information that can be gathered by cross-referencing the various sources described, the adventurous scholar may still be faced with seemingly unsolvable tasks. The vast repertoire of Pompeii's houses could assist in solving specific problems, such as the appearance and dimensions of a door or staircase, or the shape and colour patterns of a decorated vault. In the case of the House of the Greek Epigrams, scholars in the 18th century produced coloured reproductions, reconstructions, and sometimes catalogues of excavated decorations that can be used as a reference to reconstruct certain elements in our model.²⁵⁵

In many cases, the numerous examples from other houses in Pompeii may again not be sufficient, for instance, in the case of the size and arrangement of the wooden beams covering an *atrium tuscanicum*. Pompeii does not offer much information on this specific construction detail and a treatise such as Vitruvius', which I will discuss in the next section, can only be useful to a certain extent. This led to the decision to widen the range of possible references to the site of Herculaneum,²⁵⁶ where second floors, beam holes, and wooden structures are notably better preserved thus allowing to suggest a possible solution to the problem.²⁵⁷ These were found in the House of the Bicentenary (V 15), House Insula V 11, and the House of Neptune and Amphitrite (V 7). For the specific case of the House of the Greek Epigrams, the House of the Bicentenary was chosen, having an *atrium* with similar structural characteristics (length and breadth of the room and the width of the walls enclosing the space) (Fig. 21).²⁵⁸

255 In addition to the works already mentioned by Geremia Discanno and the Niccolini brothers, another source is the volumes by Wilhelm Johann Karl Zahn (1829–1859).

256 Herculaneum, only 14 km from Pompeii, shared with it and other sites buried by Vesuvius in AD 79 the same tragic fate.

257 Whether an *atrium* should necessarily be covered or not is another interesting question that this study has explored in depth in **Papers I** and **II** and will not be discussed here.

258 Maiuri 1958, 227.

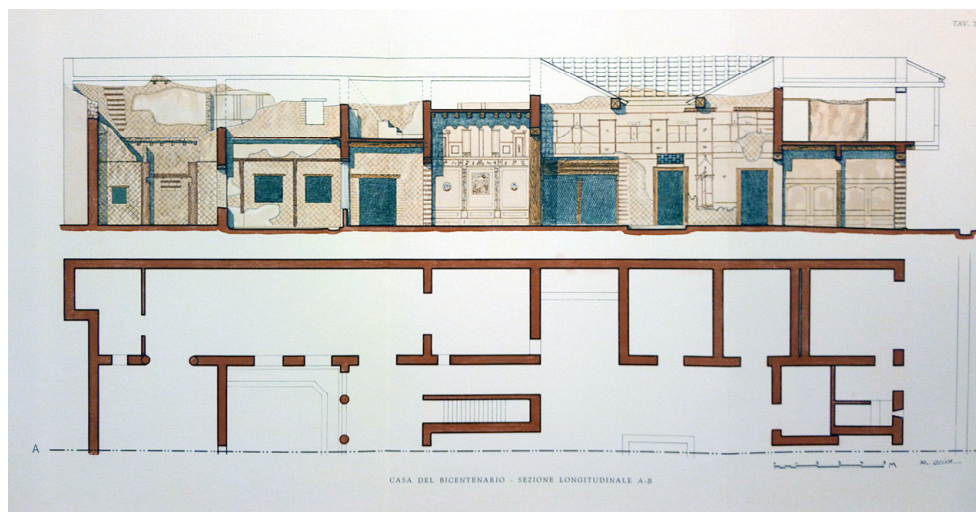


Fig. 21

House of the Bicentenary, Herculaneum, longitudinal section, and reconstructive hypothesis, after Maiuri 1958, table XX.

5.1.5 Ancient literary sources on building practices

This section naturally includes the well-known treatise by Vitruvius. Several caveats have been introduced in the studies referenced in this work concerning the use of the information included in his *De Architectura*. Leach warned about the use of Latin terms and their direct application to the archaeological remains found in Campanian houses.²⁵⁹ Labels such as *fauces* and *alae*, for example, are only found in Vitruvius' text. Where Vitruvius used the term peristyle (*peristylia*), other authors prefer *porticus*, *ambulatio*, or *palaestra* or *xystus*. The term *oecus* (large open room) occurs only in one Latin author other than Vitruvius.²⁶⁰ Terms such as *diatae*, nuclei of two or three rooms, are used by Pliny and Justinian but not by Vitruvius.²⁶¹ In this sense, Allison noted that “without careful assessment, in each case, of the validity of applying terminology from one context to the conceptual framework of another, the result is a very prescriptive and unifying approach to an aspect of past human behavior that, in all probability, had been much more fluid and diverse”.²⁶² This is a precise caveat against the direct application of prescriptions by Vitruvius when reconstructing houses in Pompeii. Fitting the physical remains in the

²⁵⁹ Leach 1997.

²⁶⁰ The Elder Pliny refers to a kind of mosaic pattern (*asaroton oecon*) (HN 36.184).

²⁶¹ Leach 1997, 67.

²⁶² Allison 2001, 185.

Vitruvian mould would lead to biased results since spaces in the houses of Pompeii differ from the ideal model prescribed by Vitruvius in many respects.²⁶³ This is also evident in the case of the recommendations concerning wall renderings. Vitruvius suggested seven successive layers: a first rough layer, three layers of mortar made with sand, and three layers made with powdered marble.²⁶⁴ Pliny instead parsimoniously suggested five layers: three of mortar made with sand and two made with limestone and marble.²⁶⁵ Examples following these recommendations are rarely found in Roman architecture, where in the case of Pompeii three layers are the most common way to make the *tectoria* (wall covering).²⁶⁶

A separate discussion in **Paper II** was dedicated to the construction of the roofs of the kind of the *atrium tuscanicum*, only known through the treatise by Vitruvius. In this case, in order to reconstruct in 3D this typology of structure, the information provided by the Roman architect was supplemented with comparanda from Herculaneum (see section 5.1.4) and reflections of a technical nature given by modern scholars.²⁶⁷

5.2 Putting the sources together: the case of room m

Room m is a particular type of elongated chamber, positioned orthogonally to the other rooms opening onto the peristyle, almost hidden from view, and connected only by a small passageway to the rest of the complex. It featured Second Style decorations, as in the case of the room with the epigrams (y). This room, peculiar from the point of view of illumination as it was almost completely dark, provide a good case to summarize the reconstruction procedure that involved a diverse range of sources.

The starting point for the reconstruction was the analysis of the 3D model of the standing structures of the house which naturally generated several questions about missing information: for instance, how it was covered or decorated (*Fig. 22*). August Mau's 1877 report was again of great importance for tracing the characteristics of

263 For example, by uncritically adopting the proportions for the different spaces of the house such as the *fauces*, *atrium*, *alae*, *tablinum*, peristyle, and *triclinium* that Vitruvius prescribed (Vitr. *De Arch.* 6.3.3–8).

264 Vitr. *De Arch.* 7.3.

265 Plin. *HN* 36.176.

266 Adam 1994, 217. For the specific case of the House of the Greek Epigrams, remains of the plaster on the structures have been measured directly on the 3D reality-based model and reconstructed. Where this information was not available a three-layer scheme for the *tectoria* has been adopted.

267 Texts consulted for the building structure of the roof included Salassa 1999; Ulrich 2007; Pierattini 2009; Bergamasco *et al.* 2018. For the pitch of the roof, useful references were found in Rook 1979, 295–296 and Gerding 2013, 142.

this space.²⁶⁸ Mau's description of the room's decorations is very concise, but interestingly, he also provides measurements of what he was able to observe, for example, of the painted pilaster separating the two parts that he thought constituted the room: an antechamber and the main chamber.²⁶⁹ He also suggested that the former was probably covered by a flat ceiling, and the latter by a decorative vault.²⁷⁰ His description matched what was found in the cork model (*Fig. 23*) and the trace of a vault in stucco is still visible in the north-east corner of the room. It was therefore possible to measure the exact rise of the vault and place the plain roof. Another interesting piece of information Mau provided concerned the decoration of the floor in *opus signinum*. He informed us that the two parts of the room were separated by a decoration of white stones in the shape of a threshold while a similar square ornament marked the place of a table in the main chamber.²⁷¹ The watercolours by Discanno mirrored this subdivision of the space and illustrated the decoration of the main chamber of the *triclinium* and part of the decoration of the antechamber.²⁷² A thorough analysis of the remnants of the wall decorations by Staub Gierow contributed with measurements and details concerning the colours.²⁷³ At this point, only the pavement was missing. As mentioned, Mau provided a description of it, but no graphic reproduction was available, and it was believed in the past that this pavement had been lost.²⁷⁴ In the course of the fieldwork carried out by the Swedish Pompeii Project, the floor of *triclinium* m was cleared. A *signinum* pavement with a red coating and three decorative sections consisting of geometric motifs was brought to light again. The first section formed a kind of threshold between corridor m' and room m. The second was the decoration in line with the stucco pilaster described by Mau in his report. The third, also described very briefly by Mau, was a similar square-shaped decoration marking the place of the table (*Fig. 24*). As a final point, the decoration of the vault was completely missing. For this, an example taken from the House of Augustus on the Palatine was utilized. This complex, belonging to an influential member of the elite, was filled

268 Mau 1877, 65–66.

269 “(...) le due parti sono divise da un pilastro di stucco, largo al pavimento 0,44” (Mau 1877, 65).

270 “(...) La stanza—come tante volte, cf. Bull. 1876, p. 245:1877 p. 25—è divisa in una parte interna, coperta di volta decorativa, e un'altra anteriore (lunga 3,15) più alta e coperta di soffitto piano” (Mau 1877, 65).

271 “(...) un ornamento di pietruzze bianche a guise di soglia nel pavimento, che del resto è semplice di opus signinum; un simile ornamento di forma quadrata segna il posto della tavola.” (Mau 1877, 65)

272 Presuhn 1878, vol. 2. The Niccolini brothers' reproductions further included a sepia-coloured drawing of the decoration of the north wall of the chamber.

273 [http://www.pompejiprojektet.se/decoration.php?hid=7&hidnummer=9374584&hrubrik=V%201,18%20Casa%20degli%20Epigrammi%20greco&rid=32&ridnummer=2126651&rrubrik=Room%20m%20\(triclinium\)&did=37&didnummer=8975133&drubrik=Wall%20decoration%20\(extant\)#](http://www.pompejiprojektet.se/decoration.php?hid=7&hidnummer=9374584&hrubrik=V%201,18%20Casa%20degli%20Epigrammi%20greco&rid=32&ridnummer=2126651&rrubrik=Room%20m%20(triclinium)&did=37&didnummer=8975133&drubrik=Wall%20decoration%20(extant)#)

274 Staub Gierow 2007, 109.

and levelled for the construction of the temple of Apollo on the Palatine (*Fig. 25*). This allowed the Second Style decorative ensembles to be preserved.²⁷⁵ A 3D reconstruction of the room was then built based on the geometric information available from the physical remains, Mau's reports, colour reproductions from the 19th century, the cork model, graphical documentation created by the architect Ezequiel Pinto-Guillaume for the Swedish Pompeii Project, the report from the Swedish Pompeii Project, and data from the House of Augustus on the Palatine.²⁷⁶

275 For a recent analysis of the Second Style ceilings of this complex, see Lipps 2021.

276 A series of textures were created with raster graphics software and applied to the 3D model. Of course, in this case, the reconstruction did not involve a considerable inferential process that can nevertheless be identified as inspired by inference to the best explanation. As explained in **Paper II**, processes of an inductive or analogical nature (such as the application of the same decorative pattern present on the north side of the main room to the south side, which in the cork model appears as severely deteriorated) are in any case attributable to an IBE process.

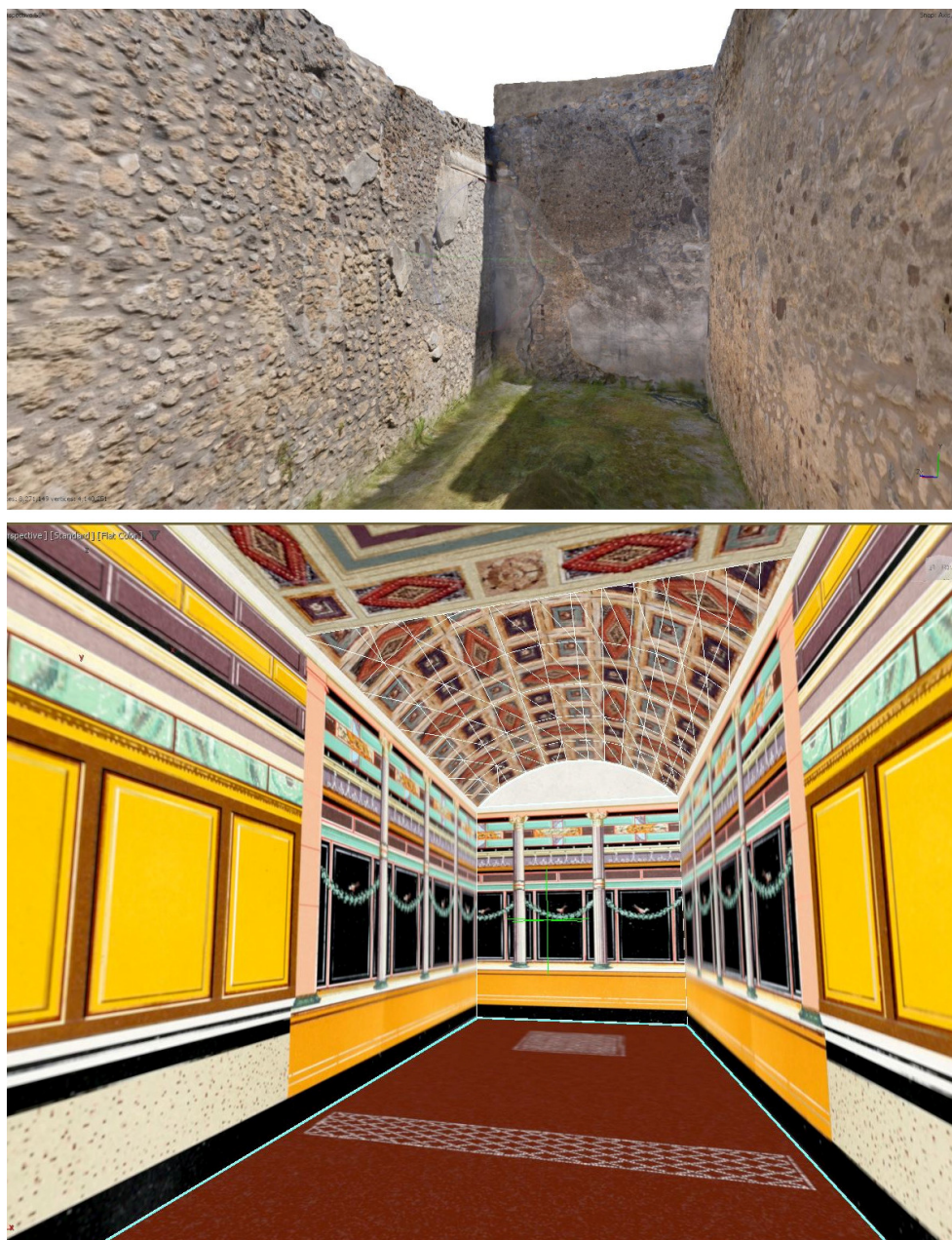


Fig. 22

House of the Greek Epigrams. At the top, perspective view of the reality-based 3D model of the surviving structures in room m, at the bottom, perspective view of the 3D reconstructive model of the same room.

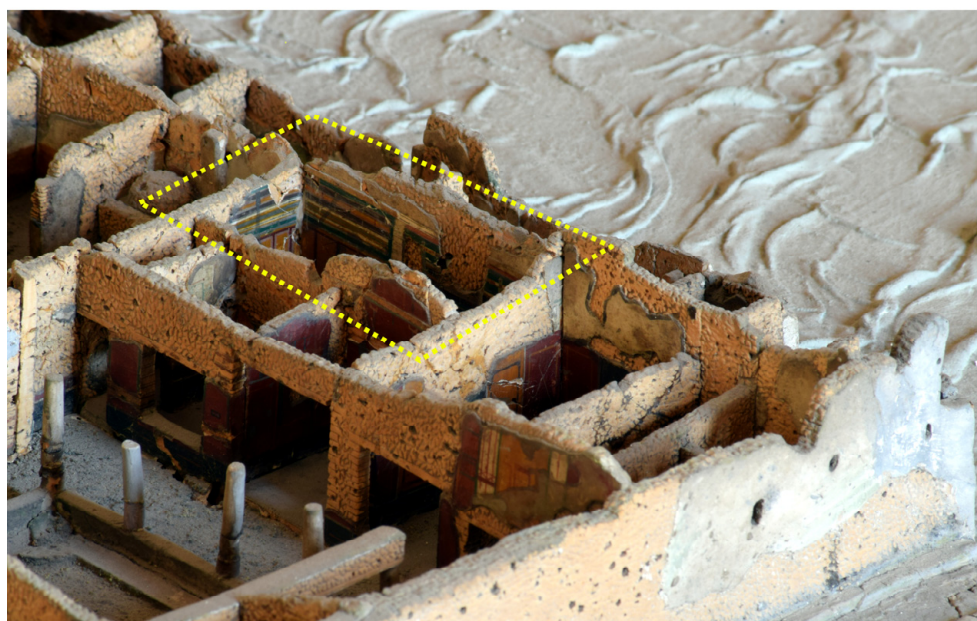


Fig. 23

Details of the portion of the cork model of Pompeii showing the remains of the decoration of room m.
 Photograph: author. Courtesy of Ministero della Cultura – Museo Archeologico Nazionale di Napoli.

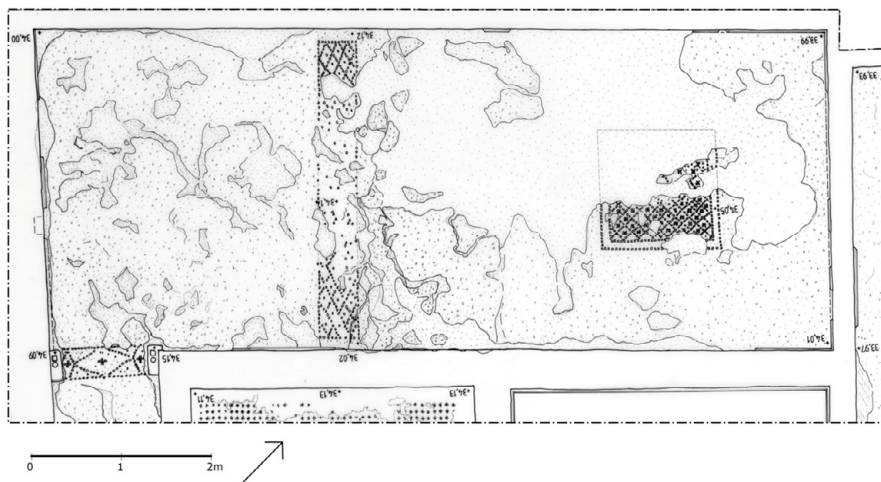


Fig. 24

House of the Greek Epigrams, plan of room m. The drawing shows the decorations rediscovered after the clearing of the floors during the fieldwork of the Swedish Pompeii Project (adapted from Pinto-Guillaume, courtesy of the Swedish Pompeii Project).



Fig. 25

Decorated vault of the hall of the ramp in the House of Augustus on the Palatine. Photograph: photographic archive of the Parco Archeologico del Colosseo. Courtesy of Ministero della Cultura – Parco Archeologico del Colosseo.

5.3 Reliability of the 3D reconstruction

The ever-growing production of 3D virtual reconstructions in the field of cultural heritage has raised important issues of reliability, scientificity, and transparency as the initiatives such as the London Charter and the Sevilla Principles testify.²⁷⁷ The difficulty of grasping the complexity of reality is patently obvious. However, this does not exempt us from the need to try to find a possible way of describing the reliability of the individual parts reconstructed in our 3D models, albeit symbolizing it in an approximate way. This section aims to do that.

As we have seen, a reconstructive or interpretative 3D model can be seen both as the best possible reconstruction from an available set of candidates and as the means to refine the chain of reasoning based on IBE. This includes a series of acts of interpretation (hypotheses and accounts), based on different typologies of records, each carrying its own level of uncertainty related to the different sources involved. The concept of reliability can thus be introduced as an expression of the level of uncertainty. An important step is therefore to assign different levels of reliability to the elements that make up the chain of reasoning: the hypotheses and thus the competing accounts. For the specific case study, we can approach this by identifying a hierarchy consisting of five categories (*Table 2*). Each typology of source entails a different degree of reliability.

Consider the case of the remains of a wall. The physically preserved part we are investigating has very high reliability.²⁷⁸ The lower level in the range described in the table [VLR] relates to a potential reconstruction entailing greater interpretative leaps, while the higher level [IR] for the specific case study, would ideally refer to a perfectly preserved structure from AD 79. Within this frame, physical remains are considered the most reliable sources (without reaching a value of [IR] intended as an ideal state). Decreasing values are progressively assigned to the data concerning the house coming from the investigations of the 19th century, consistency of information (e.g., coherence between the pitch of a sloping roof and a second floor suggested by the physical remains), similar cases in Pompeii or Herculaneum, and the literary sources. A clarification is needed here. Ancient literary sources have no less reliability as such in this process, but the level of reliability decreases as the distance of the selected source from the specific case increases. If there were ideally some ancient literary sources describing the architectural concept of the House of the Greek Epigrams, they would have a much higher level of reliability than a generic ancient passage on domestic architecture.

277 <http://www.londoncharter.org/>; <http://sevilleprinciples.com/>.

278 Depending on the degree of modifications a structure may have undergone over time (think, for example, of cases of heavy modern remodelling in imitation of past techniques that are difficult to detect in rubble masonry), the initial degree of reliability may also fall from VHR to intermediate values between VHR and HR.

We know that the physical remains of the structure have a high level of reliability. What would then be the level or reliability of the reconstructed part? To do this, a series of measurements (factors of reliability) may be assigned to the different levels of reliability (*Table 3*). As shown, only perfectly preserved structures from AD 79 reach the factor of 1 which is considered a reference value.

Following the procedure of the IBE reasoning chain, our selection of records will be:

$S1 = \text{the physical remains of a wall}$

Accordingly, the hypotheses explaining this record supposing we are interested in the height of wall will, for example, be:

$H1 = \text{ancient literary sources about wall construction}$

$H2 = \text{comparanda, for example, from Pompeii or Herculaneum}$

Each of those hypotheses will carry its own factor of reliability (FR), so:

$$FR_{H1} = 0.05$$

and

$$FR_{H2} = 0.1$$

Our best reconstruction (BR) will therefore be:

$$BR = (H1 \ H2)$$

and will inherit the reliabilities of both the hypotheses. This will give:

$$FR_{BR} = (FR_{H1} + FR_{H2}) = 0.15$$

that will position the reconstruction between low and moderate reliability (A in *Fig. 26*). As we have seen the IBE model represents the best explanation (in this case the best reconstruction) for the present state of knowledge. This means that when new information enters the picture, a new best reconstruction will be available, and accordingly a new level of reliability.

Assume then that we have a new record. For example, a negative trace was left on the upper part of a wall abutting the one we are investigating (B in *Fig. 26*). A new hypothesis can thus be added based on the consistency of the parts, which could explain the presence of negative traces on the adjoining wall by the fact that they

belonged to the wall we are investigating and once reached the height of the adjoining one. The corresponding FR that will be inherited by the BR is as follows:

$$\begin{aligned} BR = (H1\ H2\ H3) &\rightarrow FR_{BR} = (FR_{H1} + FR_{H2} + FR_{H3}) \\ &= (0.05 + 0.1 + 0.25) = 0.4 \end{aligned}$$

The new hypothesis will place the reconstructed element between moderate and high reliability. As shown the level of reliability is now higher than in the previous example due to the addition of new information to the picture.

To make this information manifest and easily readable on the 3D model a colour might be assigned to the specific level of reliability, for example, green for $F = 1$ (ideal reliability), yellow for $F = 0.25$ (moderate reliability), and red for $F = 0$ (null reliability). A colour ramp built between these three colours would show all the intermediate values as interpolation. The resulting 3D model with colours applied might provide users with an indication concerning the reliability of the main elements constituting the model in a clear and effective way (*Fig. 26*). The investigation of possible modalities of automatic transferring of information from the reasoning chain, including the value of reliability, to the 3D model, would be out of the scope of this work. Other authors have investigated similar issues,²⁷⁹ proposing methodologies that would interestingly harmonize with what has been proposed in this study.

279 Demetrescu & Fanini 2017

Table 2

Levels of reliability related to the sources used for the reconstruction.

Type of source	Level of reliability
Perfectly preserved structure 79 CE	Ideal Reliability [IR]
Physical remains	Very High Reliability [VHR]
Reported description (cork model, excavation reports, reproductions)	High Reliability [HR]
Consistency of the parts (roofs, second floors)	Moderate Reliability [MR]
Comparanda (other houses)	Low Reliability [LR]
Ancient literary sources on domestic architecture in general	Very Low Reliability [VLR]
No information	Null Reliability [NR]

Table 3

Factors of reliability associated with the sources used for the reconstruction.

Type of source	Level of reliability	Factor of reliability (FR)
Perfectly preserved structure 79 CE	Ideal Reliability [IR]	1
Physical remains	Very High Reliability [VHR]	0.98
Testimonies (cork model, excavation reports, reproductions)	High Reliability [HR]	0.5
Consistency of the parts (roofs, second floors)	Moderate Reliability [MR]	0.25
Comparanda (other houses)	Low Reliability [LR]	0.1
Ancient literary sources on domestic architecture in general	Very Low Reliability [VLR]	0.05
No information	Null Reliability [NR]	0

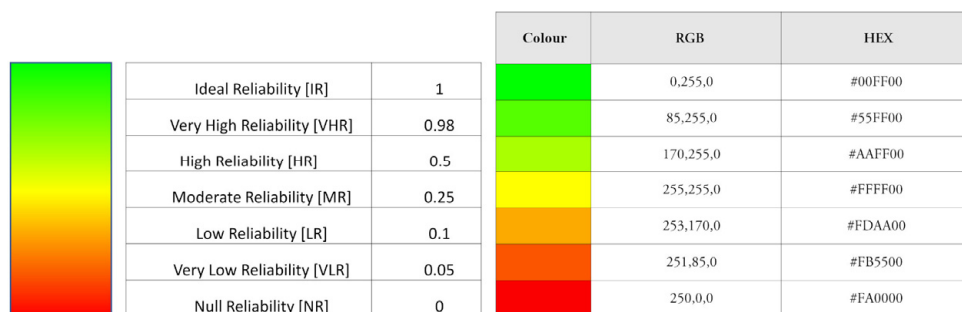
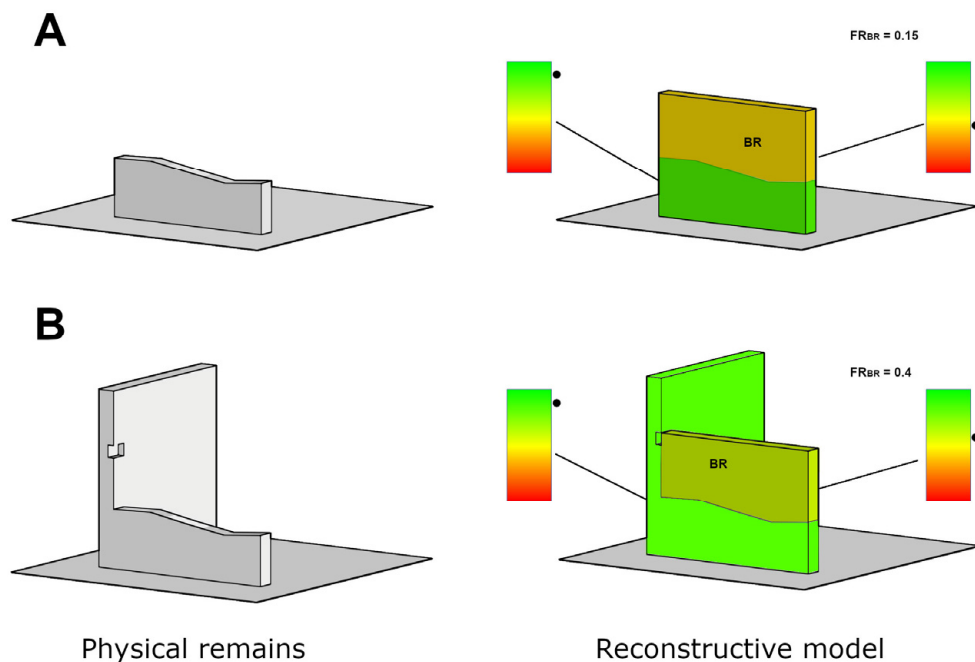


Fig. 26

Different levels of reliability of a reconstructed wall based on: (A) literary sources and comparanda; (B) literary sources, comparanda, and physical remains. A colour is assigned to the specific level of reliability. Green for $FR = 1$ (ideal reliability), yellow for $FR = 0.25$ (moderate reliability), and red for $FR = 0$ (null reliability). A colour ramp built between these three colours shows all the intermediate values as interpolation (colours are specified as an RGB triplet and in hexadecimal format, or hex triplet).

6 Overview of the individual papers

Paper I

This paper presents a study of a pattern of reasoning, the inference to the best explanation (IBE) applied to archaeology, introducing a novel model for recording the argumentation process. It explains in detail what IBE is, and how it differs from abduction, and compares it to deductive and inductive models.

For over a century, IBE has accompanied standard disciplinary practices in archaeology. To investigate the intertwining of IBE and archaeological reasoning, some traits of the recent history of archaeological theorizing and its connection to the philosophy of science were reviewed. The paper then analyses the specific issue of explanation in archaeology and how to identify one explanation that is better than the others. Then it defines a model for recording archaeological reasoning, with some references to earlier work or studies conducted in the legal field. The model devised reveals that this pattern of reasoning is very relevant and answers a call for the use of stronger argumentation. Moreover, it illustrates how an IBE-based methodology is also capable of tackling issues of transparency and efficiency in the management of digital archaeological data.

Paper II

This paper illustrates how the model devised in **Paper I** can be effectively used for constructing unitary hypotheses from complex and multiple data sets in a transparent way. Specifically, the model was used to address issues related to the roofing of the *atrium* of the Roman house. A critical review of previous studies of Roman domestic space has led to a re-evaluation of the traditional narrative of the *atrium* house, suggesting that it may have been uncovered or partially covered even in the last phase of its life. Scholars, therefore, have proposed to abandon deductive procedures that tended to fit material remains into the Vitruvian mould. They called for a convergence of impulses previously cultivated in isolation, combining new theoretical frameworks and a careful examination of material evidence. The paper illustrates how the new IBE-based model developed in **Paper I** can be effectively used to respond to this critical call. It applies the model to the case study of the House of the Greek Epigrams and presents a 3D reconstruction resulting in the best

explanation possible at the present state of knowledge. This study is a necessary step to face the problems of the 3D reconstruction of the House of the Greek Epigrams, needed to perform the following steps of light simulation and analysis, and eye-tracking-based investigations. For this scope, physical remains have been used in the first place, but also testimonies such as archaeological reports from the excavators of the 19th century, old depictions, comparanda from other houses in Pompeii and Herculaneum, and ancient literary sources such as the *De Architectura* of Vitruvius.

Paper III

Based on the concept of light as a powerful social agent, this paper looks for new insights into social and spatial behaviour in the Roman house through the simulation of natural and artificial light conducted on the 3D reconstruction of the House of the Greek Epigrams. Light, far from being simply a medium, would evoke agency. Illumination is used to reveal people, places, and things in culturally specific ways, and a continuous process of manipulation and orchestration of the world by means of light is an active component of social life in every culture. As previous research has shown, the organization of the Roman house is shaped by the necessity to provide an atmosphere and setting that facilitate patterns of behaviour, but that very space and atmosphere, in turn, would influence the activities that it encloses. This study suggests that by leveraging light as an active component of social orchestration, it is possible to gain new insights into this dynamic relationship. After reconstructing the House of the Greek Epigrams, a lighting simulation was performed using professional software, calculating the level of illumination of every room and the related visual impression, for each hour of the Roman day during the solstices and equinoxes. In addition, the contribution of artificial light from oil lamps was investigated. The study presented in this paper, therefore, combined investigations of the existing body of evidence (both textual and material), the level of illumination (physical world), and visual simulation (visual world) of the Roman domestic space to disclose new insight concerning the social dynamics of the Roman house, prefiguring routines other than those identified by literary sources and a constant interplay with shadowed spaces.

Paper IV

This paper presents an innovative methodology combining VR-based eye tracking and 3D GIS technologies to ascertain, record, and measure visual attention within the virtually reconstructed space of a Pompeian house. Data on the visual experience of five differently trained users moving within the virtual environment were recorded through an eye-tracking device under two markedly different lighting conditions. This provided information about the users' position in space, what they were looking at intently, and for how long. Subsequently, these data were imported within a 3D GIS environment. In this way, this research was able to define an unprecedented pipeline to record the visual experience in a reconstructed ancient context, quantify it, and analyse it, harnessing the analytical power offered by GIS systems. Furthermore, this study, building on recent contributions from visibility studies in archaeology, which integrate quantitative and experiential approaches, takes a step forward by integrating 3D GIS and human visual attention data.

Paper V

In this paper, ancient perception is investigated by leveraging the data collected during the visual experience discussed in **Paper IV**. Ancient literary sources repeatedly emphasized the relevance of view and viewing, in particular its beneficial effects on the individual. Literary descriptions of villas often lingered on the views that opened from the spaces the ancient authors describe, and several legal issues were also concerned with the right to an unobstructed view. In this context, view and viewing in the domestic space would have played a key role. Different views would have corresponded to equally distinct social and religious rituals and the complexity of the decoration would have been chosen in accordance with the nature of the view. Furthermore, the experience of the house would have been intentionally differentiated between insider and outsider. Notably, the view from the outside would have purposely hidden the luxuries and fantasies of the house. The views from the inside, in turn, would have served the purpose of negating the mundane reality, luring the viewer from the outside world. To date, studies concerning view and viewing in the Roman domestic space, although seminal, have relied on two-dimensional plans, single reconstructive perspective views, or direct experience of fragmentary physical remains as the basis for their considerations. This has led, inevitably, to an investigation by freeze-frames, where the ancient viewer is firmly positioned in a place even in the most dynamic situations and where the influence of illumination or movement—both body and the eyes—can hardly be considered. Importantly, studies in the field of visual attention have highlighted how the perception of the external world is achieved selectively by means of a series of

attentional mechanisms. The eyes of the observer would choose areas to linger on under the influence of a multifarious range of factors, with movement and illumination playing a fundamental role. In addition, depending on the position and the vicinity of the viewer to a particular portion of the decorated space, the very same architectural setting might have afforded different social rites. This paper utilizes the data collected, and the methodology presented in **Paper IV** to investigate how illumination and movement/proximity might have influenced the ancient perception in the House of the Greek Epigrams in Pompeii and how the architectural settings participated in the construction of the social identity of the owner of the Roman house.

7 Conclusions and implications

In this research, light has been used as a key to study the social dynamics of the Roman house. However, from the fragmentary data in our possession, how can we achieve a reconstruction of daylight and artificial light in spaces and define their role in the dynamics of identity construction and their influence on ancient perception? In this sense, the researcher is faced with two fundamental problems, apparently located at opposite ends of the spectrum. The first, already addressed in section 2.1, is incomplete data. The second is how to manage the creation of new knowledge, that is new data to support research, often obtained using new technologies. **Paper I** and **Paper II** answer these questions and raise the issue of framing the problem through a single theoretical approach (IBE). In addition, they tackle the question of how to formulate our answers to archaeological questions in a transparent and equally robust manner. This also especially concerns virtual reconstructions, as study models mirroring our interpretative choices and inferential dialectics.

In **Paper III**, the light was used as a trigger to better understand the social dynamics within the Roman house. What activities could take place and at what times of the day and year, and by whom? How do the results obtained through these methodologies relate to what the ancient authors described? How does light act within the social dynamics of domestic space?

Papers IV and **V** explore the topic of ancient perception and the manipulation of light and shadow for the social orchestration of activities. How did light influence the perception of painted spaces? How is this sensory manipulation of spaces also related to the proximity relationships of visitors in different spaces?

7.1 Inferential modes

In **Paper I**, the study of IBE applied to archaeological reasoning, accompanied by a model for recording the argumentation process, revealed that this mode of reasoning is highly relevant and answers a call for more robust argumentation. A methodology based on IBE is also able to address issues of transparency and efficiency in the management of digital archaeological data.

Previous work showed that the IBE has been a silent companion of archaeological argumentation for more than a century; this means that researchers have used this

model and still do so in their daily practice. This leads to the question of whether researchers should devote time to compiling an inferential model when they already apply IBE on an everyday basis, or when they at least adhere to a certain logic or common sense in their work. Of course, there is nothing inherently flawed in pursuing this approach, and the purpose of this paper is certainly not to prove that such reasoning leads to fallacious results. Why then formalize our interpretations through this model? Such a question is often encountered when addressing the issue of the “need” for theory in scientific research, particularly in the field of archaeology. Introducing his discourse on archaeological theory, Matthew Johnson has prompted how adopting “common sense” in archaeological practice is not enough. Archaeologists assuming their work is “atheoretical” are in fact hiding the theoretical assumptions that they use in their critical scrutiny. Since “we are all theorists” whether we like it or not, archaeologists should instead be explicit about the intellectual basis of their choices and evaluate one interpretation of the past against another to decide which is the stronger.²⁸⁰ This apparent distrust, especially after the so-called theory wars in archaeology between the 1960s and the 1990s,²⁸¹ explains the fact that even though this inferential mechanism is common to the history of archaeological reasoning, a specific model for its application does not exist, which has naturally led to limitations in its use.

As we have seen, the use of a model for the recording of archaeological reasoning, a kind of transparency logbook, allows for a clearer definition of the issues and the construction of more robust theories, guaranteeing a better future for our interpretations and thus improving the quality of archaeological knowledge production at large. Moreover, the characteristic schematism of the described model enables this information to be easily archived along with our interpretations. The archaeologist’s traditional narrative together with all the other information and the chain of reasoning that led to certain choices then becomes a fundamental tool in the hands of future scholars. They will be able to retrace all the underpinning arguments and restart the chain of reasoning by introducing new information when available, leading to novel best explanations. Consequently, I examined examples of IBE in law and schematization of archaeological reasoning, with the aim of designing a new model based on IBE for recording archaeological argumentation.

The proposed scheme showed the potential to facilitate the management of digital data in the future, e.g., by including schematization in the paradata accompanying the data to be archived. This means that the 3D models produced can be delivered to future users with an additional apparatus of information regarding the set of choices made by the scholar in producing the reconstruction. This implies an additional degree of transparency extended not only to the sources used but also

280 Johnson 2010.

281 The “processual/postprocessual wars” that have dominated much of the theoretical debate in English-speaking countries (Johnson 2010, 213).

concerning how those sources or materials were combined and which hypotheses were identified and discarded.

Paper II presents an application of the IBE model devised in **Paper I** to the *atrium* of the House of the Greek Epigrams, the primary case study of this research. As many scholars have repeatedly pointed out, for a long time Vitruvius was used as a sort of blueprint for the definition of the *atrium* house. Often this has led to straining the data, especially from Pompeii, within a certain Vitruvian mould, in a kind of deductive process. This has proven to be fallacious from many points of view and authors have shown how the archaeological remains do not adhere to the ideal model constructed over time of the *atrium* house and how the very terminology used represents a dangerous tool for deductive reasoning. The very fact of assigning a specific term traditionally associated in the literature with certain functions to a room can even unwittingly determine our choices as researchers. Thus, analyses conducted on the material remains found inside Pompeian houses have shown how the evidence is different from what was traditionally recounted. The multifunctionality of spaces is the understanding on which scholars currently concur. Wallace-Hadrill has shown how in fact it is possible to gain a new perspective on a traditional assumption, the evolutionary patterns of the *atrium* house, through precise scrutiny of the archaeological remains.²⁸² Of great importance for this study is the suggestion that the presence of an *impluvium* should no longer be considered a specific indication for a typology of roof. Open *atria*, of the type with overhanging eaves, could coexist with the presence of an *impluvium*, at any stage in the life of a Roman house, thus escaping the constraining idea that the open courtyard should only represent an evolutionary stage of the traditional *atrium* house. This naturally presents the researcher with a renewed challenge in approaching the problem of covering the central space, and in general in dealing critically with the space of the Roman house. We thus need to reconcile impulses that are very often cultivated in isolation, such as the definition of new theoretical frameworks and the scrupulous analysis of the archaeological evidence in an epistemological void. This aspect was also underlined by Kavas, who pointed out that to critically examine the past scholarship on Roman domestic space, one should move from deductive to inductive reasoning.²⁸³ In this light, **Paper II** highlighted how in fact the inductive procedure itself makes use of IBE.

The proposed model of reasoning thus assumes crucial importance in the process of critically reviewing the past literature on the Roman house, echoing the call of Wallace-Hadrill and Kavas.²⁸⁴ It allowed for the recording of the entire archaeological reasoning process, which starts from the available data (material

282 Wallace-Hadrill 1997.

283 Kavas 2012.

284 The objection that recent contributions in this field of study, while not presenting their reasoning in a formalized manner, appear to be intrinsically logical is answered by what was said earlier about the entirely theoretical status of our archaeological practice.

remains, reports, and archaeological documentation past and present) and arrives at an archaeological interpretation, creating a robust yet transparent system. An important result of this study is that the reconstructive model should not be seen just as the final projection of our interpretative efforts, but also as a valuable tool in our hermeneutic armoury. In fact, the construction of the 3D model itself allows us to start a process of hypotheses refinement. Moreover, it becomes a source of data generation itself, as we shall see in section 7.3, thanks to the analyses that can be performed on it. The IBE-inspired chain (*Fig. 6*) thus defined can become an open hermeneutic model that can be used indefinitely according to the information introduced from time to time, which can generate a new and better explanation.

7.2 ...and more inferential modes

Inferentiality aimed at the best solution finds applications in very diverse scientific activities as well as in everyday life, as emphasized by many studies. This aspect interestingly connects to the findings from the lighting simulations conducted on the House of the Greek Epigrams and described in **Paper III**.

The results of the analyses showed how the visual dynamics varied constantly in the house. The combination of specific times of day and seasons of the year would in fact dictate unique lighting characteristics in each room. Furthermore, the lighting conditions would not have allowed a perfect perception of colours and details except in very rare cases. A very significant point was made about the fact that activities of a social nature could take place in the domestic space that made memory the main instrument. Elements often repeated, or simply inflected in a different way, organized through the play of contrasts or assonances could inspire mnemonic processes that the owner of the house could establish. In the room with the epigrams, many authors have identified interplays of memory between the different figures represented, both in the central panels and in the background architectures and the epigrams themselves.²⁸⁵ The Dionysian theme would permeate from one wall of the room to the other. From the struggle between Pan and Eros in the presence of Aphrodite, the offering of the nets to Pan or the golden statue of Bacchus, to the scene of the nibbling goat. A particularly interesting theme is that of the conundrum to which the central painting refers (Homer's riddle) and which becomes a kind of reminder of the activity that could have taken place in this room. The pleasure of wine, of the ecstasy of the amorous encounter (struggle), but also, the mnemonic game so popular in Roman *symposia*, which the reference to the nets (a symbol for puzzler) recalls.²⁸⁶ To this, however, we should add a further level of articulation of

285 Bergmann 2007; Prioux 2011; Squire 2012; to name the most recent contributions. See section 4 for a thorough examination of the past literature on the house.

286 Bergmann 2007, 75, 81.

this all-mnemonic social game, related to the atmospheric veil of light and shadow within the room. Like the other spaces in the house, this room must be regarded in connection with the light and shade in which it was bathed. As seen from the results, in some instances, and this is the case, for example, for the west side of the *exedra* (y), the light conditions were extremely low throughout the year. This implies that much more had to be left to inference during the activities within the room. Moreover, these mnemonic connections would not have been limited to a single room. An important element to consider is movement, the experiential interconnected journeys made from the entrance of the house to a specific room (**Paper V**). During these journeys, visitors would be exposed to the visual and poetic paraphernalia contained in the wall paintings of the house, enhanced, or concealed by gradations of light and shadow. This would have contributed to constructing a mnemonic repertoire ignited by the combination of time, season, space, and movement. Different elements would be available from time to time to the visitors, who would perhaps find in the epigram room the culmination of a pleasurable playful journey inside the house, where all the characteristics of the perfect *symposium* could be realized and where, fuelled by changing memories, attempts to answer questions posed by the host would be successful. The use of skilfully arranged or commanded artificial lights would have added a further level of surprise within an icono-textual social game. This would represent a culmination of the perceptual experience of such high value as to induce the master of the house to preserve the Second Style paintings in the room with the epigrams.

7.3 A houseful of shadows

In **Paper III**, we saw how the social dimension of the Roman domestic space would thrive on the interplay between light as a physical phenomenon (*lumen*) and light as a sensuous phenomenon (*lux*), and their orchestration. I contend here that darkness was the constant companion of all interactions in the house and must be rediscovered by us. Throughout the year, in fact, most surfaces in the house would be perceived under mesopic vision.²⁸⁷ This would have resulted in defocusing and impaired colour perception compared to photopic vision or vision in bright light. However, spaces perceived in this way would have captured the senses to a greater extent than a perfectly lit environment. This would have been part of the process of

287 To function properly, the human visual system must adapt to prevailing light conditions. Three operating states can be identified in this adaptation process: photopic vision, scotopic vision, and mesopic vision. In photopic vision, colours and details are perceived. In scotopic vision there is no perception of colour and the ability to distinguish shapes and details is poor. Mesopic vision is the intermediate state between the photopic and scotopic states. The complete results of the simulations can be accessed at <https://www.darklab.lu.se/illumination-matters/>.

sense manipulation to which the domestic space would have contributed, through the combined use of natural and artificial light.

The lack of uniformity in the distribution of illumination would have aided accessibility of spaces so that in less brightly lit spaces it would still have been possible to move around without getting completely lost. However, light clues would have been able to help visitors to avoid straying from the right path. This would have been especially true during the morning greeting (*salutatio*), when the *fauces*, the central area of the *atrium*, and the *tablinum* could have served as important illuminated landmarks. With this regard, the level of illumination in the *atrium* would be congruent with the routine suggested by literary sources, which place early occupations of members of the elite in the first two Roman hours of the day. On the other hand, the lighting conditions could have allowed for a variety of activities (production and reception) at times of the day not included in the ancient literary evidence, such as during the fifth hour of the summer solstice. The *atrium* would therefore have made it possible to carry out activities at a time when the domestic space could be controlled by women or simply indicate routines different from those depicted in ancient sources. Specialized activities that required more light could have been carried out in this space between the third and eleventh hours. Furniture might have been placed according to the tasks and the variation in lighting in the room.

The activities in the different spaces of the house would depend both on the season and the different times of day. At best, the lighting level of the rooms opening onto the *atrium* (c, d, and f) would have allowed only basic orientation. Similarly, for the rooms that opened onto the peristyle, the use of spaces would have depended not only on the season but also on the time of day. The owner of the house might have chosen for example room l for morning meetings, especially in summer. Rooms n and o would have been especially appreciated during the fourth hour in winter or the eleventh hour in summer. Rooms p and y would have been preferred for encounters in the late hours of summer or mid-day in winter. However, the owner would have known exactly which room to use when the occasion called for a more sober atmosphere or soft lighting. Spaces such as room o would have been particularly suitable for many activities, including reading.

The results of the analyses also have significant implications for weaving and its location within the house.²⁸⁸ In particular, they indicate where this activity could have been carried out under more favourable lighting conditions, that is, providing full colour and detail discrimination. Although this activity could have been performed by experienced hands with eyes closed, these conditions may still have been particularly important for the weavers in the learning stage. Findings from this research show that this activity could have begun in the *atrium* shortly after the first

288 No evidence relative to the performance of this activity was found in the house; however, the results obtained in this regard can make a significant contribution to the field of study of this activity in the Roman house in general.

hour, while the *salutatio* was in progress, virtually continuing throughout the day. With regard to the other rooms in the house, weaving could hardly have taken place in the elongated *triclinium* p or in the room with the epigrams (y) (also because of a question of space), or in room l. In contrast, rooms n and o could have housed this activity throughout the day. This study thus reinforces the idea that weaving could have taken place in spaces other than the *atrium*, possibly in conjunction with other activities and in the presence of other individuals, providing a private, domestic virtue with public recognition.

In the *atrium*, many Roman numerals found on the south wall, one of the brightest parts of this space, reinforces the idea that ancient graffiti was not intended to be hidden. In addition, the better lighting conditions may have favoured the placement of a family pet as the subject of the decorative programme in room l, increasing its visibility, perhaps in accordance with the owners' request. In the same room, a central painting depicting an erotic theme of a Satyr rejected by Hermaphrodite or a Bacchante would have enjoyed favourable exposure.

The results thus obtained could be extended to the more general picture of the Roman house. On cold winter days, when the front doors remained closed, spaces within the house would be relatively dark throughout the day and only the peristyle offered a minimum of daylight. It follows that our consideration of Pompeii's surviving wall paintings should also be based more on the spatial dynamics of daylight and the resulting conditions of perception. The dimmed light impregnated precious objects on display, such as the silverware displayed in the *ala*. This departed from contemporary Western standards, embracing rather the traditional Japanese sense of discomfort with shiny things and the elegance of a space founded on endless gradations of darkness. The words of Jun'ichirō Tanizaki about the traditional Japanese house seem to resonate with the results of this research.²⁸⁹ Light in the traditional domestic space, he contended, was more than sufficient for reading, writing, sewing: to increase it would have been a useless waste, destroying any residue of shade, and turning one's back on traditional aesthetic values. As in the case of Japanese *maki*—lacquered wooden objects often decorated with gold or silver—the faint glow of an oil lamp in the Roman house would have given a grave, sober, and nobly reflective appearance. Moreover, the dim light and gradations of shadow would have been complicit in the subtle balance of luxury and virtue (**Paper V**). Like the craftsmen of the *maki*, those who produced silver objects might have had dimly lit rooms in mind. The expensive wall paintings in the house were by no means well-lit, as we would expect today, and as archaeological photographs suggest. Learning games performed as a form of entertainment could have included the many shades of darkness and the use of artificial light as an additional part of the playful puzzles in a sort of multiplication of the inferential experience as we have seen. As with precious objects, the execution of wall paintings could not have ignored the light conditions in which they would be appreciated once completed.

289 Tanizaki 1977.

Moreover, the polished surfaces that would naturally help to diffuse the light would themselves have acquired a noble and grave dimension from the light itself, as in the case of Japanese lacquers. The colours would be the result of many layers of darkness and the scene depicted in the wall paintings would be interpreted through an inferential play of memory. Artificial light was therefore the necessary complement to daylight throughout the day. The required light management presumably led to an established practice that depended on the day and the season: sometimes the incidence of sunlight was blocked by curtains, and at other times the shady corners of the room were illuminated by lamps. The wandering light choreographed the domestic community in different occupations throughout the house. Tasks that could not be performed in the dark rooms would take place in the *atrium*, which at certain times of the day would be entirely given over to women and domestic service.

In the literary sources, men's activities in the house were invariably mentioned, which strongly influenced the research discourse, but hardly reflects social reality. When reading about the morning greeting or the social dinner, for a long time we tended to assign an exclusive status to these activities and to imagine the other members of the family away from them. If, on the other hand, we think of a broader domestic community present in these central rituals—in the background or even in the foreground—the Roman *domus* comes to light not only as a place of family identity but also as a place of diverse possibilities for social participation.

7.4 A dialogue of light and rituality

In **Paper V** we saw how ancient sources emphasized the importance of vision in different domains, not least the legal one. With reference to the spaces of villas, highly appreciated views would have determined the attractiveness and thus the inherent value of these dwellings. Research carried out on the material remains of Roman houses, especially in Campanian contexts, found confirmation of this interest in the view. Every aspect of the domestic space participated in the construction of the social identity of the family that lived in it, and view planning would have been certainly no exception, assuming a special role in the construction of the self. Furthermore, the Roman house would also have revolved entirely around a rituality that, as we saw in section 2.3.1, mixed change and continuity, helping construct the *Romanitas* of the family. On the other hand, in a competitive society such as the Roman one, the need to flaunt luxury played an equally fundamental role. Only those who had access to the innermost parts of the house would have enjoyed a fantastic dimension in which luxury could find its proper place. This would have made it necessary to establish balances that would allow one to move skilfully between *austeritas* and *luxuria*.

The study described in **Paper V** goes beyond the single or multiple views introduced by previous scholarship in terms of freeze-frame and provides a more nuanced interpretation of perception within the domestic space. In this sense, we referred to interconnected journeys within the house rather than single views. Eye and body movement and displacement in space—thus proxemics—and time—thus illumination—generate a complexity that previous researchers' models have only partially accounted for. We contend that proxemics mediated by illumination would have played a key role in the activation of social rituals. For instance, from the *fauces* on, visitors would have easily connected the figure of the peacocks reproduced on the back wall of the peristyle to the ritual cult of Juno. The goddess, in fact, featured in one of the painted medallions in the *atrium*, as were Jupiter and Minerva, in a kind of bi-dimensional *lararium* dedicated to the Capitoline triad. However, once through the *tablinum*, the same birds would have allowed more fortunate visitors to make another association, this time with the mystery cults of Dionysus. Travelling in the opposite direction through the *atrium* space, the observer would have caught the group of deities of Mercury and Minerva framing the entrance. New associations would have taken place, perhaps triggered by the panpipe played in a room of the peristyle area.²⁹⁰ The myth of Io, materialized in the visitor's mind, would have created new connections between Minerva, Juno, Jupiter, and the peacocks, transcending the boundaries of Roman virtuosity and subtly suggesting a connection to Isiac rituals.²⁹¹

The space of the *atrium* and its significant groups of deities oriented the visitor's movement in the space, encouraging a spiral circulation associated with social rituals of patronage or reception. As described, this would also have led the visitor to move in the opposite direction to the main *fauces/atrium/tablinum* axis. Proxemic interactions with the deities mediated by light would have had an emotional dimension caused by the crossing of glances. The spectator would have found himself caught up in the love triangle between Venus, Mars, and Vulcan. The gaze of the goddess would have sought out that of the visitor, creating an emotional involvement. At the same time, the crowding of deities would have had an interesting connection with a famous episode recounted by Ovid about the discovery of Venus's betrayal with Mars by Vulcan.²⁹² The latter, the son of Juno (also present among the medallions in the *atrium*), set a trap to expose them. Caught in the act,

290 During the excavations in January 1876, a bronze syrinx was found in room o (MANN inv. no. 111055).

291 The myth was recounted by Ovid in the *Metamorphoses* (1.553ff.). Io had been abducted and turned into a heifer by Jupiter to hide his adultery. Juno, far from being convinced by this artifice, wanted the heifer as a gift and placed it in the custody of the many-eyed monster, Argos. Mercury, urged on by Jupiter and disguised as a shepherd, after lulling the monster to sleep with stories about the origin of Pan's pipe and with the help of the sound of the pipe itself, killed Argos. Juno then transplanted the eyes of Argos into the feathers of the peacock, while Io, saved by Jupiter, became a goddess herself, later identified with the Egyptian goddess Isis.

292 Ovid *Met.* 4.171–189.

their cheating was shown to the gods, ending in general hilarity. The crowding of the medallions in the *atrium* of the house, so unusual, could find explanation therefore in the re-enacting of this story, emotionally entangling human and divine beings in a movement that is anything but axial. Similarly, the golden Bacchus, *aposkopon*, that is, in the act of spying would have created an emotional connection with the invited guests in search of cultured meanings in the room with the epigrams. The Silenus lying in the grass on the back wall of the peristyle would be displayed only to the privileged who had access to the *viridarium*. On the same wall, the crude hunting scene would have generated an idyllic, Dionysian atmosphere that would have intertwined with the other possible views, for those who crossed the portico. Here a myriad of sensory stimuli would have overlapped with the various possible views, towards the garden, through the columns, in the blurring of real and fictitious greenery of the *pluteus*, in the views glimpsed from the rooms opening onto the peristyle. The cries of sacrificed animals and the intense smell of burning essences in the *viridarium* would have suggested religious ritual activities. Burned remains of domestic birds sacrificed to the god Mercury would create an imaginary teleportation to the same deity guarding the entrance door. This would generate a spatial connection between the parts located at the far ends of the house. Mnemonic connections, blurred by the lighting conditions, would then infuse journeys through the house. The visitor, after emotionally encountering Venus in the *atrium* as a betrayer, finds her in an upturned role as Adonis's unrequited lover. Then as a deity overseeing the gardens, in a liminal position towards the Dionysian atmosphere of the *viridarium*. Then again Venus is capable of disarming Mars in room o, and then as a witness to the victory of love/Eros over everything/Pan in the room with the epigrams. Here the traditional idea of a reception space being associated with a semi-reclined posture can be abandoned. Instead, movement through this small room would have ensured access to the images and the text at the same time, multiplying the interpretative possibilities also mediated by the light and other sensory stimuli coming from the peristyle.

As we have seen, the albeit seductive image of static views, be it the *fauces/atrium/tablinum/* axis, or views to or from or between reception rooms, greatly reduces the complexity of the perceptual act. Instead of speaking of one or more views, we claim that interconnected journeys took place within the house in which distance and movement of the body and eyes, as well as time, were decisive and in which the physical journey intersected with the imaginative journey through mnemonic hyperlinks identifying different rituals.

In the introduction to this study, I have emphasized how every aspect of the Roman house contributed to the social construction of the identity of the owner and the *Romanitas* of his family. I underlined how the decorated space lives perceptually only by virtue of the interaction with light and the people who moved within these

spaces, in a culturally loaded entanglement. Objects exposed to the view of others shared the same variable atmospheres of lights and shadows. This did not unfold as a static, passive backdrop against which to place a handful of tasks suggested by literary sources. Social orchestration of activities in the house would take place precisely by exploiting the possibilities offered by the combination of light and shadow, and in relation to the bodily dimension of the observers. Repeated gestures with varying degrees of balance between novelty and stasis in combination with decorated, object-filled environments perceived through countless veils of diaphanous shadows, suggests complexity and multiplicity rather than linearity. A new and unprecedented palette of possibilities enriches the information that the ancient sources have handed down to us, of new crowds, a house full of family members, women, and activities at the most disparate times of day, in place of the solitary gatherings represented in the imagery of the morning *salutatio*. Just as the grievous but inevitable fate of Dorian Gray, with which we began this journey, restores his painted image to its dignity, this work wishes to return a more varied picture, of nuances, light, shadows, richer in people, in the foreground as well as in the background.

Populärvetenskaplig sammanfattning

Det romerska huset har alltid väckt forskarnas intresse, särskilt sedan man upptäckte de områden i Kampanien som begravdes av Vesuvius utbrott år 79 e.Kr. Det som tidigare bara kunde rekonstrueras genom texter av antika författare kunde äntligen finna konkreta exempel att jämföra med. Detta ledde till att forskare använde de arkeologiska lämningarna som förebild på vad till exempel den berömda arkitekten Vitruvius från Augustus tid skrev om det romerska huset. Vitruvius tilldelade rummen namn och proportioner, som forskare använde för att konstruera ett slags idealmodell av det romerska huset. Detta var redan fallet på 1800-talet. Senare studier, särskilt under senare delen av 1900-talet, omprövade vad som tidigare gjorts och visade hur långt denna idealmodell låg från de fysiska resterna av husen som hittades, till exempel i de hus som förstördes av Vesuvius utbrott i Pompeji, Herculaneum eller de andra begravda städerna i Kampanien. Detta ledde till en mer kritisk granskning av de litterära källorna, där man försökte belysa det faktum att de som skrev de texter som har kommit till oss mycket ofta var män från en högre klass, som hade en specifik läsare i åtanke. Under tiden hade ett nytt intresse för de så kallade sociala aspekterna av det romerska huset kommit fram. Forskarna var inte längre bara intresserade av de konstnärliga aspekterna av de dekorationer som fanns i husen, dvs. om de till exempel var kopior av grekiska original eller om de var skapelser av äkta romersk konst. Husen och deras dekorationer började studeras eftersom de kunde ge värdefulla indikationer på hur de användes, en fråga som fortfarande är öppen trots de rikliga fynden, när det gäller platser som Pompeji. Studier har därför följt på varandra med tiden, där man varje gång har försökt vinna nya insikter samtidigt som man har lyft fram riskerna med att använda vissa källor i stället för andra, till exempel den möjlighet som en ingående studie av fynden i husen erbjuder för att ge indikationer om hur rummen användes.

Sammantaget visade dessa studier hur det romerska huset fungerade som ett slags reklampelare för ägaren. Hemmet för romarna var inte en tillflykt från omvärlden, det vill säga en privat plats väl avskild från arbetet. I modern tid har katastrofala händelser som pandemin gjort att vi kommit i kontakt med realiteter som distansarbete (hemifrån), och om vi tänker efter så har säkert många offentliga personer i dag svårt att skilja arbete och personlig utveckling å ena sidan och privatlivet å andra sidan i sina hem. I det romerska hemmet existerade troligen inte det offentliga och privata som vi uppfattar det idag, och det skulle vara en meningslös ansträngning att försöka använda sådana avlägsna begrepp för verkligheter som troligen var mycket annorlunda än våra. I ett konkurrenssamhälle

som det romerska fanns det ett behov av att imitera och om möjligt överträffa sin granne, och eftersom arbete och privatliv blandades i hemmet talade allt i hemmet om husets ägare och hjälpte honom att bygga upp sin egen personlighet. Allt skedde enligt upprepade gester och aktiviteter, som kan liknas vid ritualer. Både religiösa ceremonier och mer vardagliga sociala moment som att ta emot sina klienter, människor som söker tjänster och sociala middagar. Med tiden har forskare försökt att klargöra med olika metoder vilka aktiviteter som ägde rum, när och vem som deltog i dem. Dem har använt sig av olika källor, till exempel gamla texter, materiella rester av arkitektur, dekorationer och till och med målningar eller artefakter. Detta har skapat en mycket rik, men ofta också motsägelsefull bild där många aspekter av livet i det romerska huset har förblivit outforskade. Vilken väg kan man gå för att försöka förstå dessa aspekter?

Som redan påpekats bidrog det romerska huset och allt som var synligt i det som en reklam för att skapa en offentlig bild av godsägaren, av att han och hans familj var romare. Men det vi faktiskt ser, ser vi tack vare ljuset, ett enkelt koncept men lika sant idag som på den tiden. Det är bara tack vare ljuset som vi kan se saker och deras form och färg och kan få en uppfattning om var de befinner sig och förflytta oss i ett rum. Mängden ljus som kommer in i ett rum kan avgöra vilken typ av aktivitet vi kan utföra i det rummet. I ett mörkt rum blir det till exempel svårt eller omöjligt att läsa, men vi kan utföra andra funktioner där, till exempel sova eller ha möten av mer privat karaktär. Dessutom spelar ljusets kvalitet och kvantitet också roll eftersom de kan påverka "atmosfären" i ett rum. Tänk bara på skillnaden mellan en middag med levande ljus och en middag som är upplyst med industriella neonlampor. Typen av belysning är något vi kan välja, och det gör vi varje gång vi köper en lampa i affären, till exempel genom att föredra varmt ljus framför kallt ljus, eller när vi bestämmer oss för att sätta upp gardiner.

Ljuset är därför inte bara viktigt för att utföra aktiviteter, utan påverkar också vårt humör och kan utnyttjas av oss och därför manipuleras på ett visst sätt för att betona vissa saker eller dölja andra. Ljuset kan påverka aktiviteter och människor och vårt sätt att se på saker och ting. Det sätt på vilket ljuset gör detta förändras med tiden, och i varje kultur påverkar ljus- och skugghandlingar våra liv på olika sätt. I det traditionella berberhemmet är till exempel alla de mindre upplysta områdena de platser där kvinnan rör sig och arbetar, medan de mer upplysta delarna är de utrymmen där mannen sköter sina aktiviteter. I det moderna danska samhället möts familj och vänner ofta i ljuset av ett levande ljus för att skapa ett särskilt förhållande som kallas Hygge. Alla som är upplysta av flammans ljus är en del av denna händelse och är därför socialt inkluderade. I det traditionella japanska hemmet spelar skuggan en viktig roll, och det som syns är aldrig helt upplyst. Till och med dekorativa föremål är inte gjorda för att lysa i solen utan för att belysas av ett mjukt ljus och smekas av skuggan.

Tidigare studier har inte tagit hänsyn till denna aspekt av ljuset och uppfattningen om vad som var synligt eller inte i det romerska huset, eller så har de delvis behandlat den genom att göra approximationer. Detta beror på att det är en svår

uppgift att förstå hur mycket ljus det fanns i ett romerskt hus, eftersom ljuset, till skillnad från murar eller föremål, inte har lämnat några spår i efter sig. Därför är en nyckelaspekt i den här studien den tredimensionella digitala rekonstruktionen av ett hus i Pompeji, huset med de Grekiska Epigrammen. Jag skapade därför en modell där väggar, tak och dekorationer rekonstruerades som de kunde ha varit före Vesuvius utbrott år 79 e.Kr. När modellen väl var byggd användes programvara som normalt används för att göra belysningsberäkningar i nya byggnader för att förstå: 1) hur mycket ljus som kunde nå de dekorerade ytorna 2) hur de kunde se ut för en besökares ögon. På detta sätt kunde jag förstå både vilka aktiviteter som kunde utföras, just eftersom vi bara kan utföra en viss aktivitet när vi har tillräckligt med ljus. Dessutom visade denna undersökning hur dekorationerna (målade väggar och golvmosaiker) framstod för besökarnas ögon. Resultaten av dessa analyser visade en mycket intressant aspekt, nämligen att de dekorerade ytorna i huset uppfattades av observatörerna i ett läge som kallas mesopiskt. Detta är vad som händer när vi befinner oss i ett rum som inte är särskilt väl upplyst. Om det finns mycket ljus kan vi se alla detaljer och alla färger, om rummet är mörkt kan vi inte se färger och vi kan inte se detaljer. Mesopiskt seende är något mitt emellan dessa två lägen, där färger och detaljer inte är lika synliga som när det är mycket ljus, men inte heller är de så försämrade som i ett mörkt rum. Målningarna i romerska hus beskrivs ofta i alla detaljer i läroböcker och man glömmer att de inte var helt synliga. Den här studien visar just detta och hur husets rum, beroende på tid på dygnet och årstid, var mer eller mindre upplysta och därmed mer eller mindre lämpliga för aktiviteter. Oljelampor, som också användes under dagen, kunde ha hjälpt till, men skulle inte ha förändrat belysningsförhållandena drastiskt. Det romerska huset var därför ett hus som vi i dag skulle kalla lite eller dåligt upplyst, men invånarna i dessa hus lyckades komma till rätta med detta genom att utnyttja ljusets och skuggans möjligheter på bästa sätt. Detta är långt ifrån vårt sätt att se på saker och ting, men om vi tänker tillbaka på japanernas förkärlek för skuggor i det traditionella huset kan vi förstå hur förhållandet till ljus och skuggor, förändras från en kultur till en annan och över tid. Gamla litterära källor talar framför allt om två sociala händelser av stor betydelse i det romerska hemmet, nämligen mottagande av klienter som kom till sina beskyddares hem tidigt på morgonen för att be om tjänster eller hjälp, och den sociala middagen sent på eftermiddagen. Den här studien visar att de mest färgstarka förhållandena i hemmet i verkligheten existerade vid andra tider på dygnet än de som beskrivs av de antika författarna, när mannen var ute och huset kontrollerades av kvinnan. Verkligheten var därför säkert mycket mer komplex än vad de antika författarna berättar.

Många antika källor talar också om hur viktig den utsikt och det panorama man kunde njuta av från en villa var. Forskare som har studerat arkeologiska lämningar av hus, särskilt i Kampanien, har visat att husets ägare, eller hans arkitekter för hans räkning, noggrant planerade utsikten inne i husen. På så sätt var husägaren säker på att visa besökaren exakt det han ville. Dekorationerna fungerade alltså som en noggrann koreografi till det som pågick i huset, dvs. middagens mottagningar, den

sociala middagen, men också alla de religiösa riter som ägde rum i huset, kulten av de döda, husets skyddande gudar, födelse- och dödsritualer och övergångarna till vuxenlivet. Allt skedde med upprepade gester, ritualer i själva verket, som tjänade till att visa alla att denna familj var en romersk familj och att husets herre framstod så som han ville att andra skulle se honom. I fallet med huset med de Grekiska Epigrammen var detta för att visa att husets herre hade kunskap och kultur om grekiska myter och grekisk och latinsk litteratur.

Tidigare studier i detta avseende har dock återigen behandlat frågan om utsikt och vyer inne i huset, med approximationer, perspektivskisser eller i bästa fall virtuella modeller. Den verklighet som vi ser med våra ögon är mycket mer komplex än en stillbild, en perspektivskiss. Våra kroppar, våra huvuden och våra ögon är alltid i rörelse, även i de till synes mest statiska situationerna. Därför försökte vi i den här studien studera den virtuella rörelsen hos några verkliga människor inne i det 3D-rekonstruerade huset med hjälp av teknik som gör det möjligt för oss att förstå var människor tittar och hur länge. Detta gjorde det möjligt för oss att förstå hur distans och ljus påverkar vad som kan ses i det romerska huset och därmed hur detta kan utnyttjas av husets ägare. Vi läser ofta i tidigare studier att den ena eller andra väggmålningen i trädgården till ett hus i Pompeji var synlig från ytterdörren. Denna studie visar att detta inte alltid var sant och att samma väggmålning kunde kommunicera olika saker på olika distanser, eftersom olika saker var synliga på grund av distans och ljus. Detta gjorde det möjligt att inse att husets rörelse, som tidigare hade beskrivits i andra studier i enskilda perspektiv som i en serie stillbilder, i själva verket var mycket mer komplex. Gästerna skulle inte ha rört sig enligt en linjär bana utan skulle ha rört sig friare genom huset för att uppskatta de dekorationer som ljuset och skuggorna gjorde tillgängliga för dem. Delar av dekorationerna som visade aspekter av vild eller sensuell natur var endast synliga för de mest intima gästerna, medan andra endast fick ta del av detaljer som framhävde värdens dygd. Dessutom innehöll dekorerade rum avsedda för mottagning, såsom det som innehöll de berömda epigrammen i huset med de Grekiska Epigrammen, inte alltid stora möbler. I detta rum skulle man med hjälp av fri rörlighet kunna beundra målningarna och läsa den grekiska texten samtidigt, för dem som kunde, vilket inte var möjligt när man satt ner.

I slutändan är den här studien tänkt att berika det som traditionellt har överlämnats till oss från historiska litterära källor och tidigare studier. De dekorerade väggarna är upplysta väggar, men också skuggade väggar. Och så är också de föremål som visas i huset. Utrymmena belyses på ett ständigt annorlunda sätt under året och dygnets timmar. Detta innebär att olika aktiviteter kan utföras under dagen vid olika tider, och att samma dekorationer, beroende på avstånd och ljus, kan användas för att beteckna olika saker, dygd eller sinnlighet. I slutändan vill den här studien ge tillbaka en mer komplex bild av det romerska huset, som består av många nyanser av ljus och skuggor genom att återbefolka husets rum, ett hus fullt av människor både i bakgrunden och i förgrunden.

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