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CRITICAL REVIEW ARTICLE

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The spatial design of domestic colonies: a literature review

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ABSTRACT

This literature review investigates how the social ideals of domestic colonies manifested in their spatial design during the 19th and early 20th century, by using landscape and urban design principles. Although research on domestic colonies has identified common social ideals, less is known about how they materialised spatially and whether identifiable design principles emerged across this transnational movement. Our findings reveal that 'choice of location' is the most widely discussed spatial principle, tied to ideals of 'segregation', 'improvement', and 'agrarian labour'. Other principles, like boundaries, visual relationships, building orientation, and grid layouts, are less prominent but often associated with ideals such as control, Christianity, and self-sufficiency. However, few studies examine the finer details of these principles, such as variations in height and depth, materiality, or how the observer's field of view influences their perception of space. These insights are important for redevelopment strategies to respect and acknowledge their underlying meanings.

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Domestic colonies; landscape design; spatial design; social ideals; cultural landscapes

Introduction

Domestic colonies reflected a new era of social experimentation that swept across Europe, Britain, and North America during the 19th and early 20th century. These colonies sought to address urban social problems, like poverty and moral decline, through secluded and reform-oriented rural settlements, which often led to new village typologies aiming to reorder space and society (Arneil, 2017; Costa Agarez & Macedo, 2023; De Clercq et al., 2018; Kennedy, 2023; Schrauwers, 2020). Unlike oversees colonies, domestic colonies were established on undeveloped or underpopulated rural land within state boundaries, targeting specific citizens based on their social rank, mental state, religion, political stance, and/or ethnicity (Arneil, 2017, p. 1; Costa Agarez & Macedo, 2023, p. 1154). Examples include labour colonies for poor families, orphans, and vagrants; reformatory colonies for criminal or vagrant youth; farm colonies for those with mental illness, epilepsy, or addiction; as well as utopian colonies with model societies for religious, ethnic, or political groups (Arneil, 2017; Costa Agarez & Macedo, 2023; Fagerlande, 2009; Pitzer, 1997).

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Despite their differences, many domestic colonies were shaped by similar social ideals (see theoretical framework). The most prominent were improvement through segregation and agrarian labour, due to a transnational exchange of ideas among founders, visionaries, and pioneers – such as philanthropists, religious leaders, and social reformers (Arneil, 2017, 2020b). This exchange of ideas was facilitated by travelogues, published reports or articles, and at times, direct correspondence between founders, enabling them to learn from existing or envisioned colony models (Arneil, 2017; Kruiger, 1994; Schrauwers, 2001; Westendorp Boerma 1950). Through their perceived success, some colonies became influential prototypes. Well-known models include the Colonies of Benevolence in the Kingdom of the Netherlands and the Agricultural Colony and Prison of Mettray, the latter alone inspired more than 60 colonies in France (Arneil, 2017, pp. 40–45; Ramsland, 1987; Schrauwers, 2020, p. 310; Stoler, 2016, pp. 68–121; Toth, 2019).

Like many other colonies, the Colonies of Benevolence and Mettray shared ideals of reform through segregation and agrarian labour, aiming for moral rehabilitation within newly designed agrarian settlements (Arneil, 2017). These settlements significantly altered many landscapes with rectilinear layouts and geometric architecture (Costa Agarez & Macedo, 2023; Kruiger, 1994; Puddu 2023). For example, the Colonies of Benevolence (Figures 1–3) sought both to redeem the poor, orphans, and homeless through labour, education, and social maintenance, and to cultivate heath and peatlands to support the national economy (Bylemans & Vallet, 2017, 136; Schrauwers, 2020; Stuit, 2020b). This reciprocal approach 'improved' people by cultivating the landscape, and 'improved' the landscape through disciplined labour which transformed existing, irregular land-use patterns into an orthogonal landscape (Kruiger, 1994; Schrauwers, 2020; Westendorp Boerma 1927). Similarly, Mettray (Figures 4 and 5), aimed to rehabilitate underprivileged and delinquent youth through agrarian work, contact with nature, and religious discipline within a symmetrical and rectilinear arrangement centred on a church (Ramsland, 1999; Ripley, 2006). In contrast, New Harmony in Indiana (Figure 6) represented a more utopian socialist experiment within a large quadrangular building, valuing cooperative living and education along with agrarian and industrial labour (Humphreys et al., 2016; McLaren, 1996).

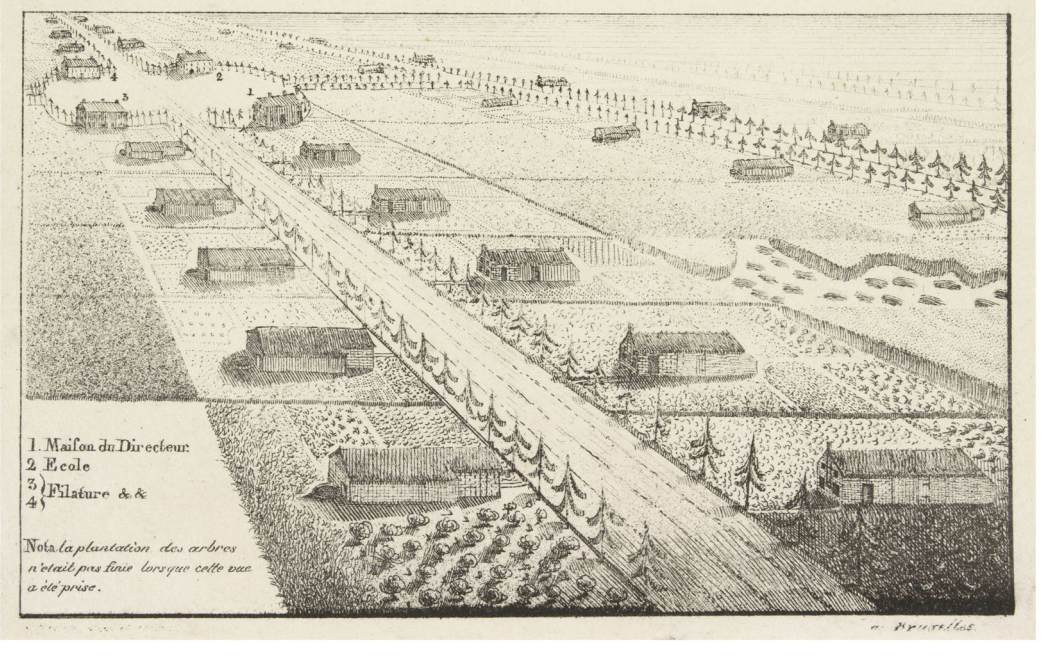

Figure 1. View of Frederiksoord Colony, print ca. 1819–1821, in Johannes van den Bosch, *De la Colonie de Frederiks-oord*, trans. Charles Louis Guillaume Josephe de Keverberg (Gent: Houdin, 1821). Rijksmuseum, Amsterdam. © Public Domain.

Figure 2. Map of the measured lands of the Institutions of Veenhuizen, ca. 1900. Drents Archive, Topographical Historical Atlas No. 312, Assen.

As recognised cultural landscapes, former colonies may require redesign strategies to address current challenges while preserving or interpreting their unique spatial features, as seen in the Colonies of Benevolence. Hence, a deeper understanding of the transnational spatial principles and underlying social ideals is needed to inform historically-informed revitalisation strategies and evaluate their ongoing influence on landscape development (Fairclough, 2019; see Crumley et al. 2017; Stegmeijer et al., 2021).

Figure 3. Extract from Steenwijk 16 showing the rectilinear layout of Frederiksoord and Wilhelminaoord in contrast to surrounding settlements and field patterns, 1853. Drents Archive, Topographical Historical Atlas No. 354.6, Assen.

Figure 4. *Mettray penal colony, Mettray, France: a general view*. Lithograph by Sauvé and Faivre after A. Thierry, 1844. Wellcome Collection, 29014i. © Public Domain.

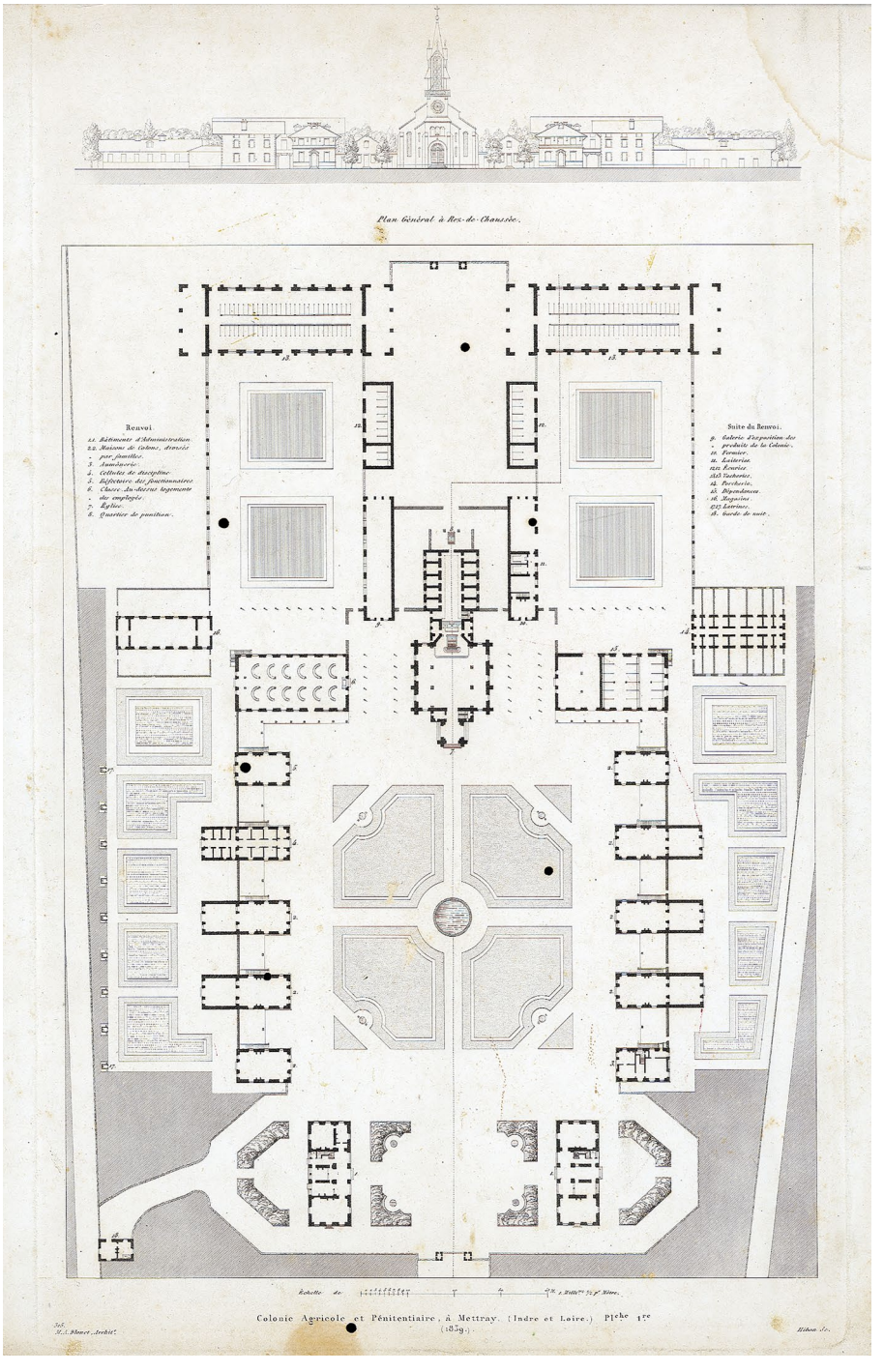

Figure 5. Plan and elevation of Mettray Colony by Blouet. Departmental Archives of Touraine, Tours.

While research on domestic colonies have gradually increased during the last 15 years, it has primarily examined the social history, resulting in the social ideals being well documented. However, less is known about how these ideals materialised spatially and whether identifiable design principles emerged across the domestic colony movement. Recent studies have started

Figure 6. *New Harmony, Indiana,* engraving by F. Bate, 1838. © Public domain.

investigating connections between the carceral ideals and architectural histories of European colonies (see Costa Agarez & Macedo, 2023; Meloni & Puddu, 2023; Puddu 2023; Schrauwers, 2020; Stuit, 2023), building on previous research grounded in Michel Foucault's theory of disciplinary power through design (Bednasek & Godlewska, 2009; Foucault, 1979; Ramsland, 1999; Ripley, 2006). Even so, research on the landscape and urban design remains limited, often descriptive with few spatial analyses, and mostly restricted to applied scientific research, such as reports and World Heritage documentation.

Therefore, this paper reviews existing research to synthesise the current understanding of how the social ideals of domestic colonies were reflected in their spatial layout principles. To this aim, we conducted a cross-disciplinary literature review that integrates socio-political and spatial perspectives, with a specific focus on landscape and urban design. This review addresses the following research question: *What is known about the relationship between the social ideals and the spatial design of domestic colonies, established during the 19th to early 20th century?*

Theoretical framework

This research is based on the premise that space is produced by people to realise specific social purposes which reflects societal ideals and relations (Berger, 2023; Massey, 2009; Schmidt & Németh, 2010). As mentioned in the introduction, domestic colonies were influenced by social ideals which often reshaped rural landscapes and created new typologies of village layouts. Therefore, we argue that the social ideals underpinning domestic colonies manifested in their spatial redesign. We chose the overarching terms 'social ideals' and 'spatial design' to group related concepts across disciplines and will clarify their definitions below.

Social ideals in relation to domestic colonies

Social ideals can be broadly defined as principles, beliefs, and ideologies. A seminal study in this area is the theorisation and comparative analysis by political scientist, Barbara Arneil, in

her book *Domestic Colonies: a turn inwards* (2017). By drawing on John Locke's labour theory of property, Arneil has shown three main ideals which are common to almost all domestic colonies in Europe and North America and which explain their moral and economic justification (Arneil, 2017). These are (1) the 'segregation' of specific social, minority, and political groups from urban centres, (2) to 'improve' them through (3) 'agrarian labour', which would simultaneously transform 'empty' land in the countryside into an economic asset (Arneil, 2017, pp. 4–5). Arneil declares that these three ideals – of 'segregation', 'improvement of people', and 'agrarian labour' – intersect with a diverse range of ideologies and beliefs, which in combination with the time period and geographical context, led to different types of colonies with different aims for specific people, which can be broadly grouped as labour, farm, and utopian colonies (2017, 231).

Spatial design approaches

Spatial design entails the composition of outdoor space (e.g. Liu & Nijhuis, 2020, p. 634) by arranging landscape elements (e.g. vegetation, water, topography) and architectural elements (e.g. buildings and objects). To study the outdoor space of domestic colonies as agrarian villages requires a landscape and urban design lens. Therefore, we briefly discuss 17 aspects outlined by landscape and urban design scholars to analyse outdoor space compositions, which are central to the social aims and functions of domestic colonies. These compositions can be based on static perspectives and perspectives in motion, as experienced by people walking, riding or driving through the landscape.

Static perspectives

Static perspectives can be described as examining the spatial form and visual characteristics from a fixed position while making use of maps and plans, or viewing the landscape 'from within' with an eye level perspective (Antrop, 2007; Liu & Nijhuis, 2020; Nijhuis, 2014). Important considerations include (1) the proportion of spaces between buildings and objects, and their (2) scale in relation to one another, or to the whole (Cullen, 1971, pp. 78–79; Loidl & Bernard, 2003; Nijhuis, 2014). Proportion and scale (Figure 7) involve the dimensioning of outdoor spaces, buildings, and objects by analysing their heights, widths, or proximity (Cullen, 1971, pp. 7, 78,79). These factors affect the function of domestic colonies through sun and wind exposure, density, openness, and the connectivity between spaces to function cohesively or independently, which groups activities closer together or further apart (Cullen, 1971, pp. 7, 78,79; Gehl, 1987; Loidl & Bernard, 2003, pp. 68–76). Thus, they also impacts human proximity and social

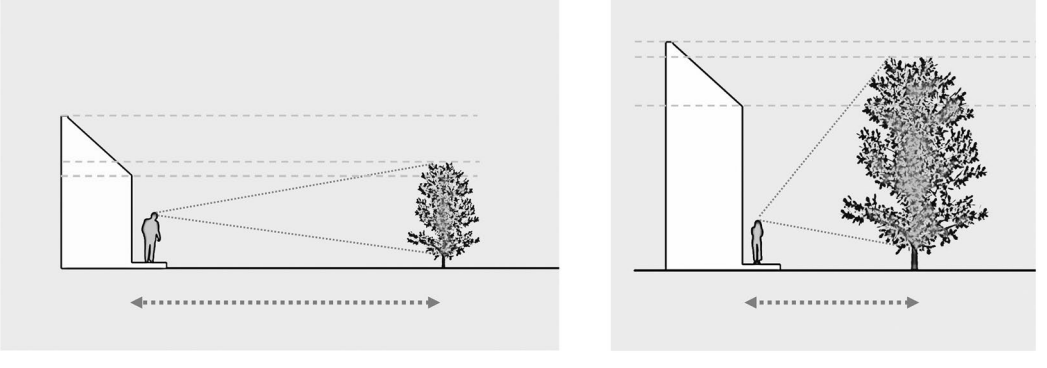

Figure 7. Wider (left) and narrower (right) proportions between elements, shown in relation to human scale and the field of view (by authors) based on Loidl and Bernard (2003, pp. 74,76).

interaction, depending on the degree of social distance, categorised by Hall as intimate, personal, social, and public (Hall, 1966; Loidl & Bernard, 2003).

The (3) orientation of buildings (front/back and entrances) and (4) visual relationships (viewshed) are also important to investigate how buildings and objects interact with their surrounding context and influence social behaviour by enabling eye contact at close range or surveillance from afar. Visual relationships, which are established through viewing angles based on people's field of view, can be described as the space(s) that can be seen from a certain location (Gehl, 1987, p. 41; Inglis et al., 2022; Nijhuis, 2014). Like the orientation of buildings, visual relationships requires an understanding of the transition between buildings or outdoor spaces and their environment (Vroom, 2006), and how people perceive the dimensions or relationships of these spaces through their senses, primarily through sight or hearing (Gehl, 1987, p. 63; Loidl & Bernard, 2003, pp. 74–76). To demonstrate, if the entrances of buildings face one another, it promotes visual-spatial links and visual contact between people as opposed to a back-to-back orientation (Figure 8). Similarly, narrow distances between buildings and/or objects, or lower height differences in outdoor spaces (Figures 7 and 8), allow people to see, hear, and move closer to one (Gehl, 1987, pp. 66–68; Loidl & Bernard, 2003, pp. 77–81).

The layout of spatial elements and their visual characteristics also influence the function and user experience of domestic colonies by linking areas, establishing recognisable patterns, and influencing how buildings, outdoor spaces, and objects interact with their surroundings (Loidl & Bernard, 2003; Lynch & Hack, 1971, p. 132). Key concepts in this regard are: (5) linear/axial; (6) symmetry/asymmetry; (7) degree of curve; (8) grid; as well as (9) the degree of visual complexity (uniformity/diversity), which creates coherence or contrast through aspects like (10) colour; and (11) materials or textures (Loidl & Bernard, 2003; Lynch & Hack, 1971). For example, the repetition of colours, textures, or shapes may enhance visual coherence through recognisable patterns which not only creates uniformity, but also influences people's perception to distinguish distinct areas with specific functions or land-use. For example, the repetition of small-scale farmhouses, with similar shaped gabled roofs, indicates residential dwellings in comparison to a large-scale church with a tall bell tower. On the other hand, more diversity creates greater

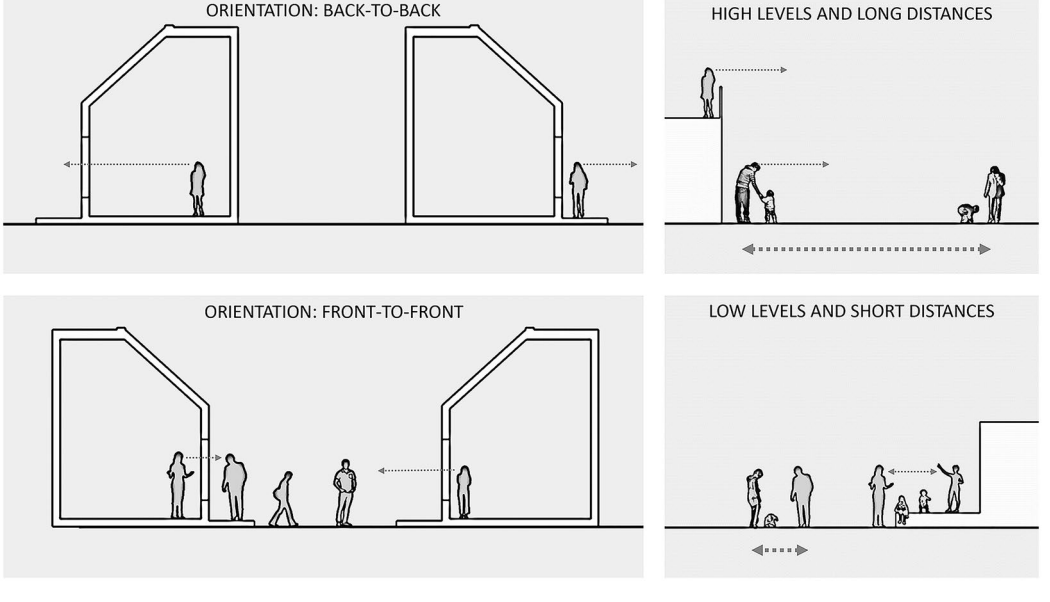

Figure 8. Diagram depicting how the spatial arrangement limits or promotes visual and auditory contact, with the orientation, levels, and distances between people (by authors) based on Gehl (1987, p. 62).

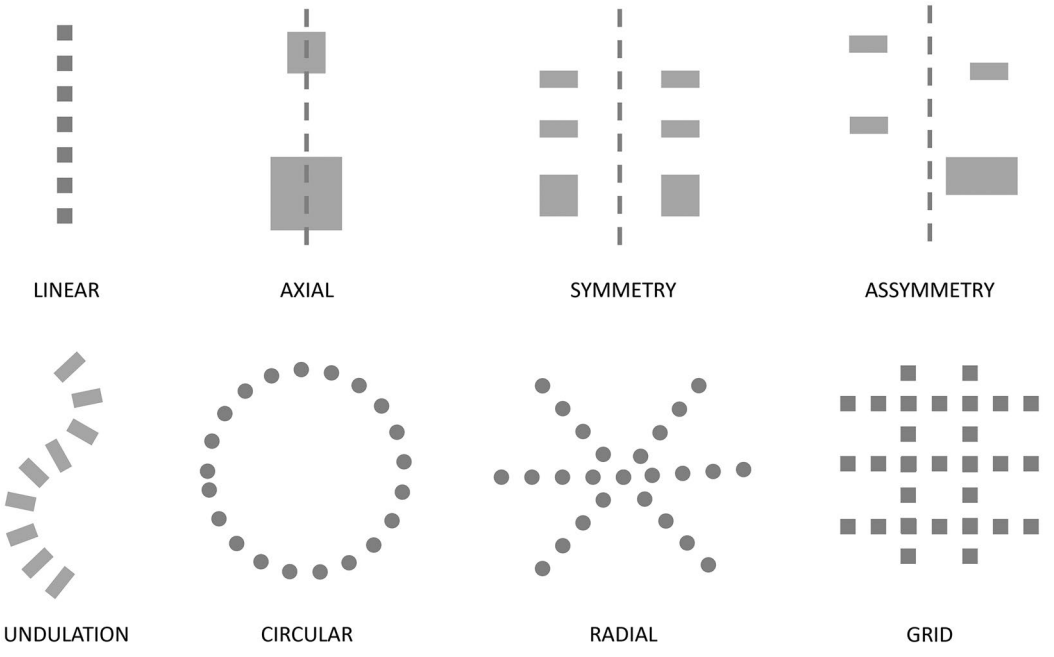

Figure 9. Layout patterns – linear, axial, symmetrical, asymmetrical, undulation, circle, radial, and grid (by authors) based on (Loidl & Bernard, 2003, p. 149; Lynch & Hack, 1971, pp. 195–196).

contrast, for instance, by altering the species or spacing of trees to provide varying levels of colour, shade, light permeability, and visual transparency, which invites different activities (Loidl & Bernard, 2003).

Similarly, the arrangement of buildings and circulation patterns significantly influenced social and agrarian activities in domestic colonies. Linear or grid layouts (Figure 9) can result in rectilinear plots and more efficient drainage and transportation of agrarian goods while enhancing surveillance and visual continuity to the path goal. In contrast, more curved layouts may limit direct sightlines and create irregular plots while radial layouts create quick access to central communal spaces (Loidl & Bernard, 2003).

Other spatial aspects to examine are (12) boundaries, (13) landmarks, and (14) the choice of location. The design of boundaries isolates or links spaces, with varying degrees of permeability and accessibility, depending on materials, textures, and height difference (Loidl & Bernard, 2003). Landmarks, defined by Lynch (1964, pp. 48,78) as identifiable reference points, aid orientation and are easily remembered due to their distinct physical characteristics. Lastly, the choice of location is vital for the social and agrarian functioning of domestic colonies, as well as the construction and layout of these landscapes. It creates opportunities or inflicts limitations due to the natural constraints and socio-environmental conditions of a given site (Lynch & Hack, 1971; Vroom, 2006). Some of these factors includes the soil conditions, water table, typography, local climate, infrastructure connections, accessibility, as well as the proximity to other towns or cities and relation to the surrounding area, including existing social practises and beliefs (Lynch & Hack, 1971; Vroom, 2006).

Perspectives in motion

Perspectives in motion considers the position of the observer in space using sight as the starting point in experiencing and valuing the landscape (Antrop, 2007; Gehl, 1987; Nijhuis, 2014, 141). This requires an understanding of how far people see, how fast they travel, and how they are

directed to move or orientate themselves in a given space (Gehl, 1987). Based on the work of Gordon Cullen, Kevin Lynch, and Loyd and Bernard, three key aspects are defined: (15) scenography along a path, (16) path form, and (17) nodes.

Scenography along a path, or Cullen's (1971) serial vision, are the existing and emerging views that unfold as a person(s) moves through space at a set speed (Cullen, 1971, p. 9). The path form plays an important role herein as a curved form provides changing views with elements of surprise, while a linear path strengthens the existing view and path goal, plus the speed of walking (Loidl & Bernard, 2003). As such, the path form also impacts the visual connection between functions and therefore, between people. An important consideration is the position of the observer in connection with the viewing direction, the field of view, and the viewing distance (Loidl & Bernard, 2003, p. 68; Nijhuis, 2014). Paths can intersect and become what Lynch (1964, pp. 47–48) defines as nodes. Nodes are strategic points, places, or special concentrations of activity that the observer is travelling to and where they might pause or interact with others. In domestic colonies, examples include the central square or identifiable communal spaces like the church or spinning hall, which provided opportunities for social interaction tied to daily activities.

The discussion of the social ideals and the spatial design presented in this section may provide important insight into the socio-spatial relationship of domestic colonies. Therefore, these ideals and design principles will be used as a focused lens to assess the content of publications.

Methods

Literature reviews are useful to systematically identify, assess, and synthesise the current state of research on a given topic (Petticrew & Roberts, 2006). We performed a cross-disciplinary review of the literature on domestic colonies to examine the current extent of knowledge on the link between the social ideals and the spatial design. Guidance was taken from the Preferred Reporting Items for Systematic Reviews to identify eligible publications. After the retrieval of such publications, we performed a thematic analysis to synthesise their content.

Literature retrieval

Identification

The review started with a two-phase literature search, which was performed in Scopus in March 2023 and February 2024. Scopus by Elsevier was chosen to include a range of international and peer-reviewed scientific journals from diverse disciplines. The first phase started with a broad scope to capture results from different subject categories with an extensive set of English keywords for 'domestic colonies', such as 'labour colonies', 'farm colonies', and 'pauper colonies'. The second phase narrowed the scope with the addition of spatial design keywords, including 'design', 'space', and 'landscape'. Notably, keywords for 'social ideals' were omitted from both phases due to limited results from trial search queries. The keywords were to be found in the title, abstract, and keywords fields and were combined with Boolean and proximity operators "AND", "AND NOT", and "W/n". The database was searched from the earliest record to the most recent to capture all possible publications including literature from the 19th and early 20th century. The final search strings were defined as follows:

> Phase 1: (TITLE-ABS-KEY ("domestic colon*" OR "labo*r colon*" OR "farm colon*" OR "utopian colon*" OR "agri* colon*" OR "pauper colon*" OR "home colon*" OR (benevolen* W/2 colon*)) AND NOT TITLE-ABS-KEY (bee* W/2 colon*) AND NOT TITLE-ABS-KEY (bird* W/2 colon*) AND NOT TITLE-ABS-KEY ("agricultural coloni*ation")) AND (EXCLUDE (SUBJAREA, "BIOC") OR EXCLUDE (SUBJAREA, "IMMU") OR EXCLUDE (SUBJAREA, "NEUR") OR EXCLUDE (SUBJAREA, "PHAR") OR EXCLUDE (SUBJAREA, "VETE") OR EXCLUDE (SUBJAREA, "COMP")

OR EXCLUDE (SUBJAREA, "MATE") OR EXCLUDE (SUBJAREA, "PHYS") OR EXCLUDE (SUBJAREA, "CHEM") OR EXCLUDE (SUBJAREA, "MATH")) AND (EXCLUDE (SUBJAREA, "AGRI"))

Phase 2: (TITLE-ABS-KEY ("domestic colon*" OR "labo*r colon*" OR "farm colon*" OR "utopian colon*" OR "agri* colon*" OR "pauper colon*" OR "home colon*" OR (benevolen* W/2 colon*) OR "penal colon*")) AND (TITLE-ABS-KEY (design OR spac* OR layout* OR feature* OR characteristic* OR organi*ation OR "spatial analysis" OR architectur* OR landscape*))

The literature search returned 287 results in phase one and 270 in phase two (Figure 10). Additionally, 17 known publications were identified through recommendations from other researchers (n = 6), citation searching (n = 4), plus relevant chapters from books found in phase 1 (n = 7). After the removal of 8 duplicates, 566 studies were identified in the first step which included 549 from Scopus and 17 known studies.

Screening and inclusion

We followed a stepwise procedure to screen and include eligible publications. Firstly, four inclusion criteria were defined as (1) accessibility, (2) type of publication (only peer-reviewed articles, book chapters, and conference papers), (3) English language only, and (4) relevance to the topic. A PCC tool (phenomenon – concepts – context) was developed to assess the eligibility of each study in relation to the topic. The PCC tool included the following: a) phenomenon of

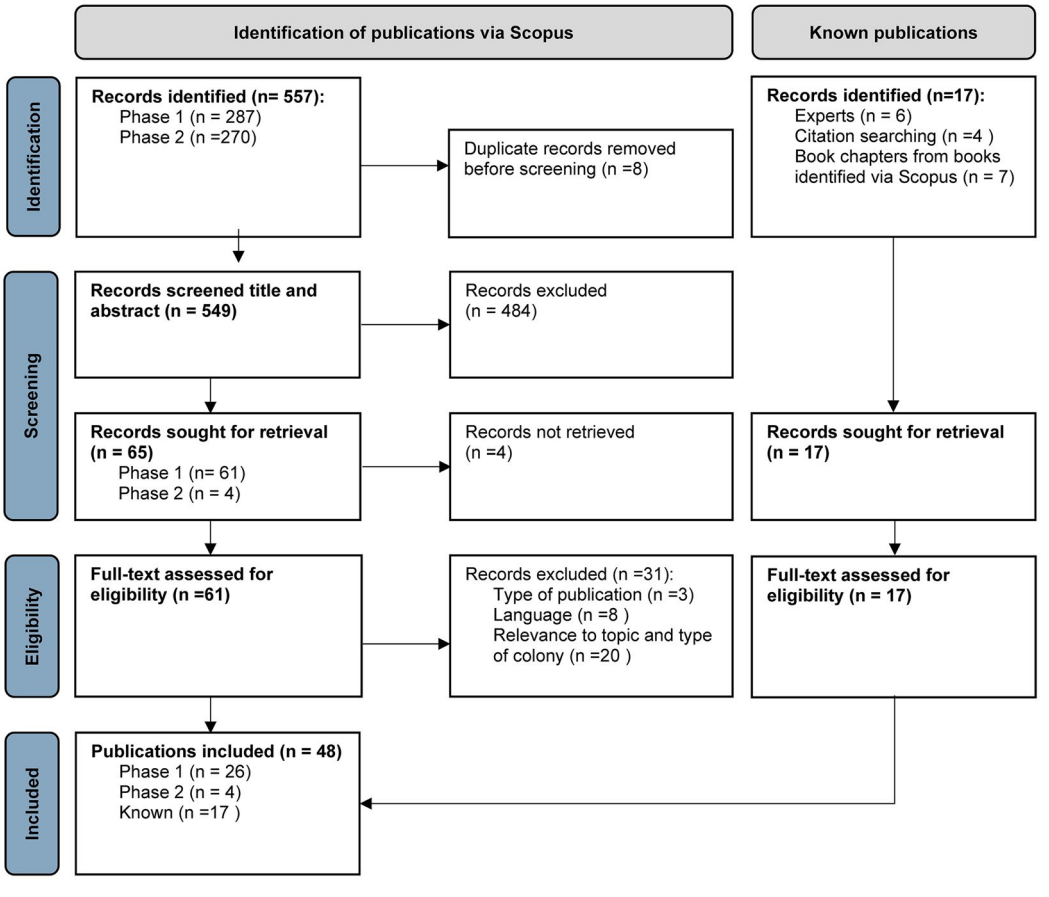

Figure 10. Publication identification and selection process (by authors), adapted from the PRISMA 2020 flow diagram by Page et al. (2021).

interest: domestic colonies, based on Arneil's theorisation (2017); b) concepts: social ideals and spatial design; and c) context: colonies established during the 19th to early 20th century.

Secondly, the titles were screened followed by the abstracts which retained 61 records from phase one, and 4 from phase two. Most of the records that were eliminated during this initial screening was due to irrelevance to the topic (category 4) and language (category 3). Examples of the former include studies on criminology, postcolonial discourses, mining colonisation; as well as external (penal) colonies in foreign states, plus prisons or labour camps which were not referred to as colonies.

Thirdly, a full-text screening was conducted to determine the eligibility of the remaining 65 records and the 17 known publications. From the Scopus records, 4 unavailable, 8 non-English, and 3 irrelevant types of publications were eliminated, along with a further 20 for not addressing the topic. Overall, 48 publications were retained for the final review (see Appendix A for Scopus publications and B for known literature).

Publication analysis

A thematic analysis was conducted to detect, analyse, and interpret repeated patterns or 'themes' relating to the 'social ideals' and the 'spatial design' (Clarke & Braun, 2017, p. 297). The analysis started with a thorough reading of all the publications to become familiar with their content. Background information was recorded in excel which included the publication details, types of colonies studied, and their colonist target groups, along with their location and year of establishment. A subsequent rereading was carried out to search for repeated themes related to the 'social ideals' and the 'spatial design'.

After documenting preliminary themes, we decided to combine deductive and inductive coding (see Table 1). The deductive codes were based on the theoretical framework which we used to generate a pre-defined set of themes. Themes for the social ideals were based on Arneil's (2017) three main principles of 'segregation', 'improvement of people', and 'agrarian labour'(see theoretical framework on social ideals). Themes for the spatial design included the 17 aspects of static perspectives and perspectives in motion discussed in landscape and urban design theory (see theoretical framework on spatial design approaches). The inductive codes

Table 1. The themes to code the social ideals and the spatial design, based on the theoretical framework in section 2 (Arneil, 2017; Cullen, 1971; Gehl, 1987; Liu & Nijhuis, 2020; Loidl & Bernard, 2003; Lynch, 1964; Lynch & Hack, 1971; Nijhuis, 2014).

Social ideals themes	Spatial design themes
Arneil (2017):	Static perspectives:
1) Segregation	1) Proportion of spaces between buildings and objects
2) Improvement of people	2) Scale/granularity of objects in relation to one another
3) Agrarian labour/improvement of the land	3) Orientation of buildings
	4) Visual relationships (viewshed)
Sub-ideals connected with 2 or more themes above:	5) Linear/axial
a. Christianity	6) Symmetry/asymmetry
b. Control	7) Degree of curve
c. Self-reliance/autarchy	8) Grid
d. Family	9) The degree of visual complexity (uniformity/diversity)
e. The rural idyll	10) Colour
f. Freedom	11) Materials/Textures
g. Equality	12) Boundaries
	13) Landmarks
	14) Choice of location
	Perspectives in motion:
	15) Scenography along a path
	16) Paths form (linear/curve)
	17) Nodes

emerged as sub-themes for the three main social ideals and are commonly reported in the literature. The sub-themes are 'Christianity' (Catholicism, Pietism, Anabaptism, Redemption); 'control' (often through discipline and surveillance); 'self-reliance or autarchy'; the division of colonist into a 'family'; the 'rural idyll'; plus 'freedom' and 'equality'.

The publications were coded in ATLAS.ti and the co-occurrence tool was employed with the 'AND' operator to identify evidence for a social-spatial link, instead of implied connections. As such, co-occurrence within the same section of the text were recorded, such as within sentences and/or paragraphs. The results of the socio-spatial co-occurrence were illustrated with the Sankey Diagram tool (Figure 11).

Limitations

The scope of the review was limited in terms language, the type of publication, and scale to review academic studies, such as English peer-reviewed articles and book chapters, with a landscape and urban design lens. Accordingly, not all spatial scales or design principles are discussed. This was done to ensure the feasibility of this study due to the vast scope regarding the publication inclusion date (from the 19th century to the present) and diversity of disciplines; and secondly, as extensive trial search queries in Scopus and Google Scholar with non-English keywords did not produce relevant or accessible results.

Furthermore, the literature retrieval and analysis were performed by the main author only. To reduce selection bias, the author meticulously strived to include eligible publications according to the predefined criteria in consultation with the other authors. The codes for the thematic analysis were jointly established and reviewed. Even so, we are aware that this may have contributed towards some bias in the selection and thematic coding procedure.

Results

We first present an overview of the different types of domestic colonies mentioned in the literature, followed by the reported socio-spatial relationship regarding the social ideals of 'segregation', 'improvement', and 'agrarian labour'. We will provide examples to illustrate their associations with spatial design principles.

Domestic colonies

Most literature discussing aspects of the spatial design of domestic colonies centres on 11 colonies, with either explicit or implicit references to their underlying social ideals. Most of these colonies are in Europe and includes the following: (1) the Colonies of Benevolence, founded 1818–1825 (Puddu 2023; Schrauwers, 2001, 2020; Stuit, 2020a, Stuit, 2020b, 2023); (2) The Agricultural Colony and Prison of Mettray, 1840 (Driver, 1990; Meloni & Puddu, 2023; Puddu 2023; Ramsland, 1987, 1999; Ripley, 2006); (3) Vila Fernando, 1862 (Costa Agarez & Macedo, 2023); (4) Meir Shfeya Colony, 1889 (Epstein-Pliouchtch & Abramovich, 2021); (5) Duxhurst Industrial Farm Colony for Female Inebriates, 1892 (Bonzom, 2020; Field, 2016c; Somerset, 1912); (6) Haschhof Agricultural Colony, 1899 (Topp & Wieber, 2009); and (7) 16 Sardinian penal colonies, 1860–1960 (Di Pasquale, 2019; Puddu, 2022, 2023). However, the review also identified several utopian colonies outside Europe, including (8) New Harmony, 1825 (Pitzer, 1997); (9) the Amana Colonies (from 1854) in the United States (Andelson, 1997); and (10) Penedo Finish Utopian Colony in Brazil, 1929 (Fagerlande, 2009); plus (11) File Hills Farm Colony for Aboriginals, 1898 (Bednasek, 2009; Bednasek & Godlewska, 2009) in Canada (See Appendix C for their typologies, citizen groups, locations, and references).

Segregation and the choice of location

Firstly, what stands out in Figure 11, is that the existing literature mainly connects the ideal of 'segregation' with the 'choice of location', which is clearly the most discussed aspect of the design. The rural location served as a segregated, reformative, and often romanticised space, based on the belief that character and health could be improved in a morally and physically restorative environment (Arneil, 2017; Arneil, 2012; Driver, 1990; Field, 2016b, 2016d; Johnston, 1998; Ramsland, 1987; Schrauwers, 2001; Stuit, 2020a; Topp & Wieber, 2009). For instance, outdoor labour in fresh air was believed to morally reform the poor and delinquent youth, and rehabilitate or contain inebriates, epileptics, disabled people, and the mentally ill in labour or farm colonies (Arneil 2018, p. 508; Bonzom, 2020, p. 280; Costa Agarez & Macedo, 2023, p. 1166; Epstein-Pliouchtch and Abramovich 2021, p. 1458; Ramsland, 1987, pp. 66–67; Topp & Wieber, 2009, p. 132; Venancio, 2011). In utopian colonies, the remote location would allow religious and ethnic groups to preserve their customs, removed from societal norms and injustices (Brinkmann, 2007, p. 310; Fagerlande, 2009; Field, 2016a; Hooton, 2017; Le Polain de Waroux et al., 2021). Additional factors which played a role include natural conditions like topography, elevation, and the quality of the soil; accessibility from urban centres and infrastructure connections (railroad or canals); as well as affordable, oftentimes peripheral land, with a low population count (Costa Agarez & Macedo, 2023; Di Pasquale, 2019; Fagerlande, 2009; Puddu 2023; Radford, 1991; Topp & Wieber, 2009).

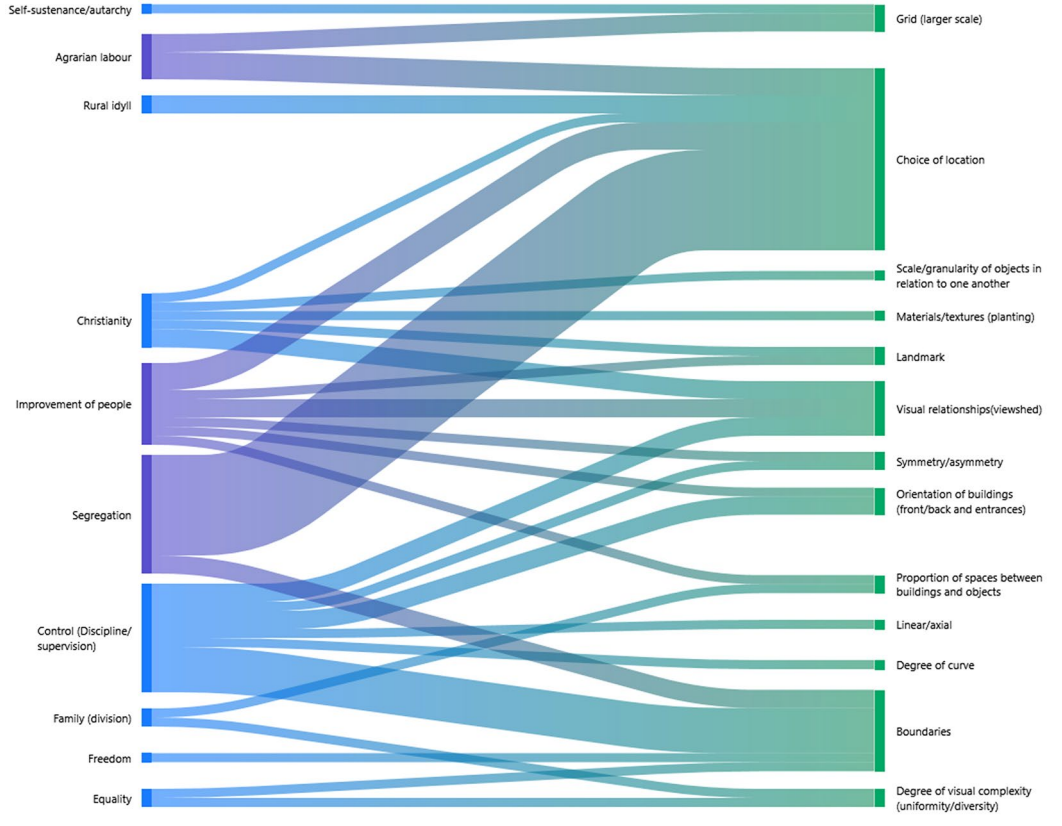

Figure 11. The reported socio-spatial corelation with the main ideals in dark blue and sub-ideals in light blue, both on the left, and the spatial design principles on the right (by authors).

Improvement of people and associated design principles

Secondly, the ideal of 'improvement of people' is also associated with the 'choice of location', yet five other design principles can be seen. Amongst them, the most frequently discussed are 'boundaries', 'visual relationships', and the 'orientation of buildings' which are mainly linked with 'control' and Christianity, as sub-ideals for improvement.

Boundaries, visual relationships, and the orientation of buildings

Some authors discuss the use and symbolic representation of 'boundaries', which differ according to the type of colony (Pritt, 1933; Puddu, 2022; Ramsland, 1999; Watkin, 1927). A primary example is the guarded moats around Frederiksoord and the central institutional buildings in Veenhuizen (both Colonies of Benevolence), which controlled the movement of the colonists (Schrauwers, 2001). In contrast, the lack of boundaries at Mettray represented an internal sense of discipline achieved through moral training (Driver, 1990; Ripley, 2006). However, at Penedo utopian colony, the absence of fences between the houses and the fields was intended to foster equality and a sense of community (Fagerlande, 2009, p. 252).

An example of both 'orientation of buildings' and 'visual relationships' is the strategic positioning of buildings to oversee the street at File Hills farm colony, which ran a north-south and east-west street at regular intervals (Bednasek & Godlewska, 2009, p. 454). Similarly, the perpendicular streets in Frederiksoord (the first Colony of Benevolence), would have enabled surveillance of the colonists farms which were located along these streets, and thereby promoted discipline, like Jeremy Bentham's panopticon (Arneil, 2021; Stuit, 2020a). Another, quite different, example of 'visual relationships' can be found at Mettray. The punishment cells of Maison Paternelle were orientated towards a courtyard with an archway, behind which the alter and crucifix in the chapel would be visible to remind the boys 'of their need for redemption' (Ramsland, 1987, p. 74).

The degree of visual complexity

In addition to the above-mentioned design principles, some studies connect the 'degree of visual complexity (uniformity/diversity)' of the architectural design with sub-ideals for 'improvement of people', such as 'family' and 'equality'. For instance, at Mettray, the uniform designed dormitories reflected the ideal of 'family' as young colonists were grouped into smaller and supervised families to facilitate discipline (Ripley, 2006, p. 404). By comparison, at Penedo utopian colony, the uniform style and scale of the houses had a different meaning in symbolising equality (Fagerlande, 2009, pp. 248, 251–252).

Agrarian labour and associated design principles

Thirdly, the ideal of 'agrarian labour', while often associated with 'self-sustenance' and the 'rural idyll', is spatially expressed with the 'choice of location' and a 'grid' layout. A few studies mention a grid pattern, often seen in the street layout and agricultural plots (Andelson, 1997; Bowie, 2018; Costa Agarez & Macedo, 2023; le Polain de Waroux, Neumann, O'Driscoll, & Schreiber, 2021). In the Colonies of Benevolence, the grid structured the entire landscape 'at multiple scales' (Bylemans & Vallet, 2017, p. 135; Puddu 2023, p. 1198). With their orthogonal, tree-lined alleys and rectangular farming plots, the landscape formed a remarkable contrast to the surrounding heathlands and medieval layout of fields (Puddu 2023; Schrauwers, 2020, p. 358). Nonetheless, only one study explicitly connects the grid design with the sub-ideal of 'self-sustenance' through agrarian labour, stating that the grid was initially designed to promote family farms (Puddu 2023, p. 1201).

Discussion and recommendations

This literature review on domestic colonies highlights a significant gap in understanding the landscape and urban design principles in connection with their underlying social ideals. The 'choice of location' is the most frequently discussed principle, often associated with the common ideals of 'segregation', 'improvement', and 'agrarian labour', as defined by Arneil (2017). However, it reveals little about how the design reflected social ideals and influenced user experience to reform the behaviour of the colonists, through mentioned strategies like control and surveillance (Bednasek & Godlewska, 2009; Desnomie, 2016; E.N.P., 1896; Schrauwers, 2020).

Other spatial principles are less frequently discussed and are rarely analysed spatially. For example, 'boundaries', 'visual relationships', the 'orientation of buildings', and 'grid-layouts' are often associated with sub-ideals like 'control', 'Christianity', and 'self-sustenance'. Additionally, housing uniformity sometimes symbolised 'equality', or 'family'. Yet, few studies examine the spatial properties of these principles, such as the permeability of boundaries, heights, depths, materiality, or the field of view from the observer's position to demonstrate visual links. Similarly, design principles related to spatial perception and orientation are scarcely acknowledged, such as 'proportion' and 'scale' of outdoor spaces and elements, plus 'landmarks', 'nodes', and 'scenography' influenced by 'path form'.

Surprisingly, the academic literature has paid little attention to this socio-spatial knowledge gap. Few publications explicitly address the spatial design and employed spatial analysis methods or included sources like ergo documents. Most rely on descriptive accounts of archival sources, such as maps, plans, and birds eye drawings, which illustrates the layout but not the embodied spatial experience at eye level.

Consequently, several aspects of how these landscapes were designed, and how they functioned to reinforce their ideals, remain unexplored. Such knowledge is essential as previous research has argued that domestic colonies were designed to influence behaviour as 'interlocked multi-scaler realms' (Puddu 2023, p. 1098). Without this knowledge, efforts to redevelop or preserve former domestic colonies may risk overlooking or misrepresenting aspects of the social aims inscribed in their design. Thus, understanding the spatial principles of these historical landscapes is important not only for academic analysis but also for guiding sensitive, historically informed redevelopment and preservation approaches.

Future research should therefore combine archival research with spatial analysis to investigate the original design of domestic colonies across spatial scales, building on theories of surveillance and power relations centred on the body in space (Foucault, 1979; Lefèbvre, 1991; Massey, 1984, 2005, 2009). Secondly, comparative analyses of design typologies and regional approaches could reveal broader patterns and divergences across European and North American colonies. Thirdly, analysing the spatial evolution of specific colonies in relation to shifting social cultural contexts and social welfare developments, could offer valuable insights into how some colonies transitioned into 'normal villages' or institutions. Such analyses should also explore how these landscapes are perceived and experienced today by local communities and visitors. Thus, a deeper understanding of how these former colonies shaped everyday life, and how they continue to influence user experience today, is the first step to revitalise these cultural landscapes without overlooking essential aspects of their meaning and legacy. In this way, greater knowledge of the inherited spatial structures and legacy of the past may help to navigate decisions on what to preserve, discard, or how to reinterpret historic spatial design attributes.

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Use of Generative AI Statement

The authors used the generative AI tool ChatGPT (GPT-4 by OpenAI) to support language editing during the revision of this manuscript. Small sections of text, such as individual sentences or paragraphs, were edited using specific instructions provided to the AI. These instructions mainly focused on refining or checking grammar, rephrasing sentences or words, enhancing clarity and tone, and improving conciseness by suggesting ways to condense content. All AI-generated suggestions were carefully reviewed and revised by the authors to preserve the intended meaning, and no content was directly copied into the final manuscript. All references were completed manually.

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