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Interior designers' strategies for creating social office space

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ABSTRACT

The rise of remote working has highlighted the importance of office spaces that support employees' social well-being. However, there is a lack of explicit knowledge on how to design such spaces. In order to address this gap, this study explored the strategies employed by practitioners in designing social office spaces. In-depth interviews with fifteen experienced interior designers were analysed using means-end chain theory. This revealed the designers' common aim to encourage informal social interactions through creating attractive, spacious, recognisable, and spatially integrated breakout spaces. Additionally, communicating group identity, promoting visibility, and offering a cosy atmosphere aimed to foster a sense of connectedness among employees. These findings not only enable more deliberate design decisions but also serve as valuable insights for less experienced designers. Moreover, the framework of design components, affordances and design objectives that emerged from this study can enhance communication between designers and stakeholders involved in office projects.

PRACTITIONER SUMMARY

Experienced interior designers were interviewed about completed office projects to understand how they design social offices. They shared five important strategies to enhance co-worker connectedness and eleven strategies to encourage informal social interactions at work. The study identified ten types of social workplace affordances along with their specific design attributes.

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Interior design; office environments; affordances; means-end chain analysis; design strategies

1. Introduction

The office is more than just bricks. It has a vital place within the larger organisational ecosystem, implying that workplace design serves as a strategic tool to influence employees' behaviour, well-being and performance (Becker 2004). The Covid-19 pandemic and the consequent shift to remote work shed light on the social function of the office. Working from home for months, employees yearned for in-person meetings at the office, socialising, a sense of community, and shared enjoyment (Babapour Chafi et al. 2021; Colenberg and Keyson 2021; Gensler Research Institute 2020; Marzban et al. 2021). Online social connections, although valuable, proved to be a limited substitute for face-to-face interactions (Marinucci et al. 2022).

However, remote working also offers significant advantages for both individuals and organisations. Hybrid working, characterised by a combination of office-based and remote work, has now become a new reality that organisations must adapt to (JLL Global Research, 2022). In organisations where employees have the freedom to choose their work environment based on the nature of their activities, the office must be appealing, comfortable, and worth the commute, offering a purposeful presence (Leesman 2022). In light of the insights gained from the pandemic and the inherent human need for connection (Deci and Ryan 2008), the presence of ample opportunities for informal social interaction emerges as a crucial factor. Furthermore, the workplace should contribute to a high-quality and meaningful work experience (Bentley et al. 2021) and counter the potential isolation effects of remote work (Spreitzer, Bacevice, and Garrett 2020). In summary, there are ethical and timely practical reasons to create office spaces that support employees' social well-being.

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Given the evident social function of offices, the question arises of how to design spaces that foster social interaction and well-being. Social connectedness thrives when people engage in meaningful conversations, feel understood and appreciated, and have the opportunity to engage in pleasant and enjoyable activities together (Reis et al. 2000). Enhancing social well-being goes beyond simply adding a large coffee corner; it requires a multifaceted approach that supports a variety of social activities. However, the spatial requirements for social interaction may sometimes clash with the needs for focused work (Kim and de Dear 2013), requiring careful planning. While space syntax theory can predict where people are likely to meet and gather based on floor plans (Sailer and Koutsolampros 2021), it does not fully explain why people feel invited to socialise in certain spaces or what encourages them to visit and linger. Additionally, office spaces convey messages about the individuals who use them and reflect the organisation's intentions (Spreitzer, Bacevice, and Garrett 2020; Tann and Ayoko 2020). To date, there is no comprehensive framework that guides design decisions by considering both the spatial and symbolic aspects of workplace design.

The aim of this exploratory study was to enhance our understanding of the relationship between workplace design and social well-being at work by identifying design strategies for creating social office space. To identify design elements that contribute to social office space, we turned to designers as valuable sources of insight. Designers possess the expertise to compose settings from tangible design attributes. On the other hand, regular users often perceive the environment as a whole, driven by their goals and daily habits, and are typically less conscious of the individual design properties (Gifford 2014, p. 23-24). Therefore, this study adopted the perspective of workplace designers and interviewed them about their approach to creating social office space, aiming to unveil their intuitive choices. The study primarily looked at interior design and used a method called means-end chain analysis to create a hierarchical cognitive model of the designers' stated decisions. This model suggests various connections between design attributes and outcomes that can be tested in future studies.

Before diving into the details of the research method and findings, we define what we mean by "social office space" and the overall scope of workplace design. Additionally, we will explain two important theories that guide our analysis: the theory of affordances and the means-end theory.

2. Theoretical background

2.1. Social office space and affordances

Expanding on the concept of healthy offices (Jensen and van der Voordt 2019; Kropman et al. 2023), which prioritise the users' health and well-being, we can further define social offices as office environments that specifically support the users' social well-being. Social well-being at work, as described by Fisher (2014), encompasses feeling embedded in a meaningful community and having satisfying social interactions and relationships. To achieve this, social office spaces should foster a sense of community, social cohesion, proximity, and positive encounters among office workers while minimising incivility, conflict, alienation, and exclusion (Colenberg et al. 2021).

Understanding the impact of physical characteristics on the user's experience and behaviour is crucial. The theory of affordances, proposed by Gibson (1977), offers a valuable starting point in this regard. Affordances are detectable functionalities present in the physical environment that people perceive and interact with. Tann and Ayoko (2020) emphasise the significance of material affordances in their social semiotic framework, which aligns the physical and the social aspects of the work environment. They argue that the material properties of the workspace influence the nature of interactions and express meaning through the material quality of objects.

The notion of social affordances of the workplace, introduced by Fayard and Weeks (2007), highlights how the work environment facilitates informal interactions by offering propinquity, privacy, and social designation. Spreitzer, Bacevice, and Garrett (2020) delve into how design attributes act as physical markers of functionalities that support well-being at work. They suggest that aesthetic, material, and spatial attributes can evoke prosocial emotions, enhance the worker's identification with the organisation, and promote social connections. For example, personalising workspaces allows employees to connect over shared interests, while coffee bars and food spaces create a hospitable atmosphere that encourages employees to engage in casual conversations. However, empirical research on such affordances and their composition remains limited.

2.2. Interior office design

Office buildings are composed of multiple layers with a core of interior space, consisting of furnishings and spatial layout, which is surrounded by external layers of construction and installations (Brand 1994). Over time, offices have evolved from process-driven and rigidly

structured spaces into collaborative environments with open-plan layouts, shared areas, and smart office solutions, driven by technological advancements and societal shifts (Van Meel, 2000; Myerson and Ross 2003).

Various disciplines, including interior designers, architects, workplace consultants, furniture suppliers, and facility managers, may be involved in the process of interior office design (Heebels and Kloosterman 2016). Although the roles of architects and interior designers may overlap, their training can differ considerably. In the Netherlands, interior architects prioritise the relationship between interior space and individual users, focusing on safety, health, and well-being, while architectural engineers integrate buildings into the environment and protect users from weather conditions (Dutch Architects' Title Act, 2021). This study's aim of enhancing employees' workplace experience mainly falls within the realm of interior design.

The main objective of interior office design is to enhance the functionality, aesthetics, and psychological aspects of interior spaces (Ching and Binggeli 2018). Interior designers utilise spatial planning, finish materials, furnishings, lighting systems, acoustic solutions, and technology in their palette to achieve the desired experience and align the environment with user behaviour (Ching and Binggeli 2018; Heebels and Kloosterman 2016). For office interiors, this involves visualising corporate identity through colours and decorations and providing furniture tailored to specific work activities, such as computer workstations, meeting areas, and archives.

2.3. Means-end theory

Designing interior space is a complex and purpose-driven endeavour that involves strategic decision-making. Within this process, designers must carefully choose from a range of design attributes to create an interior space that effectively elicits the desired user experience and behaviour. Means-end theory, as proposed by Gutman (1982), offers insight into this decision-making process by establishing linkages between concrete attributes of an artefact, their direct consequences for the user, and their contribution to higher-order goals or values. By examining these means-end chains, we can understand why specific attributes play a significant role in the decision-making process.

According to Olson and Reynolds (2001), the anticipated consequences of these attributes, that may have become habitual but were conscious at some time in the past, are especially important to this understanding.

Originally developed to comprehend consumer decisions, the applicability of means-end theory has expanded beyond marketing to fields such as user experience, organisation, and business research (Kilwinger and van Dam 2021). In the context of user-centred design for office interiors, we argue that the principles of means-end theory are equally relevant. Similar to consumer decision-making, the cognitive process of designing can be seen as a problem-solving endeavour that involves seeking alternatives expected to yield positive outcomes while avoiding negative ones (Boradkar 2010). Consequently, interior designers draw on their expertise, considering alternative design components (attributes) and their anticipated effects on user experience and behaviour to achieve higher-order design objectives (Figure 1).

In essence, means-end theory offers a valuable framework for understanding the decision-making processes inherent in the design of office interiors. By considering the anticipated consequences and experiences of users, designers can make informed choices that align with the desired outcomes of the interior space.

When consumers purchase a product, the consequences they experience can take different forms. Some of these consequences are tangible and direct experiences, while others are more emotional in nature (Olson and Reynolds 2001). Interestingly, this distinction can also be applied to the affordances found within interior design. Functional affordances encompass the qualities of the interior space that directly enable or inhibit certain activities. For example, spatial connections that facilitate physical and visual access play a crucial role in usability, which encompasses the performance and behaviour component of user experience (Sauer, Sonderegger, and Schmutz 2020). These functional affordances provide the

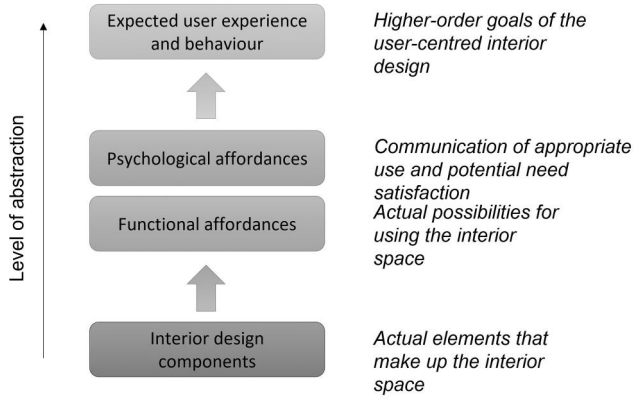

Figure 1. The means-end approach applied to understanding interior designers' decisions as a hierarchical cognitive model.

practical functionality necessary for users to engage in specific activities within the space.

On the other hand, psychological affordances manifest as more abstract qualities of interior space that rely on interpretation to evoke emotional experiences and that indirectly shape user behaviour. For instance, the atmosphere created by a particular interior design or the symbolic meaning conveyed by objects can influence users on a psychological level. This category of affordances relates to user experience as an affective outcome (Sauer, Sonderegger, and Schmutz 2020) resulting from the interaction between the user and the environment. Moreover, psychological affordances can also serve as indicators that communicate the appropriate use of the space and provide users with guidance and cues on how to engage with the environment effectively.

In summary, interior design has both functional and psychological qualities that impact usability and user experience. While functional affordances primarily focus on enabling specific activities and supporting performance, psychological affordances delve into the realm of emotions and interpretation, encompassing both affective outcomes and symbolic meaning.

3. Method

This study applied means-end approach in four stages (see Figure 2) to identify design attributes and affordances that are assumed to support social well-being.

In the following sections, each step of the means-end chain approach is explained.

3.1. Data collection

3.1.1. Participant selection

Dutch interior designers who had more than five years of working experience and regularly designed office space were recruited through the first author's network. Interior designers and architects with different educational backgrounds and working in different types of agencies were invited to reflect the profession's diversity. Several industrial designers were approached for participation but none of them had recently been involved in projects that matched our scope. The participant's consent for using their data was confirmed through email. The study was approved by the Human Research Ethics Committee of the first author's affiliation (reference #1835, 11-10-2021).

The majority of the interviewees were trained as interior architects at an art academy in The Netherlands. Two had a grade in architecture from a university of technology and four had a different background, for example in fine arts. Five worked at an agency that specialised in office design, seven worked as interior designers in multiple sectors, and three worked for agencies that focused on architecture and building construction. One participant was male and 14 were female, which reflects the dominance of women in the profession of interior design (van Kempen, Mathot, and Kloosterman 2021).

3.1.2. Interview procedure

In the emailed interview invitation, the participants were asked to select one or two of their completed office projects that aimed to support the social well-being of the users as defined by Fisher (2014). Each interview focused on one or two specific design projects rather than on the designer's approach in general in order to simulate them to provide concrete and realistic examples of their decision process. Their projects included renovations and new building constructions, shared buildings, and buildings accommodating one organisation.

At the start of the interview, the aim of supporting social well-being was repeated and the designers were

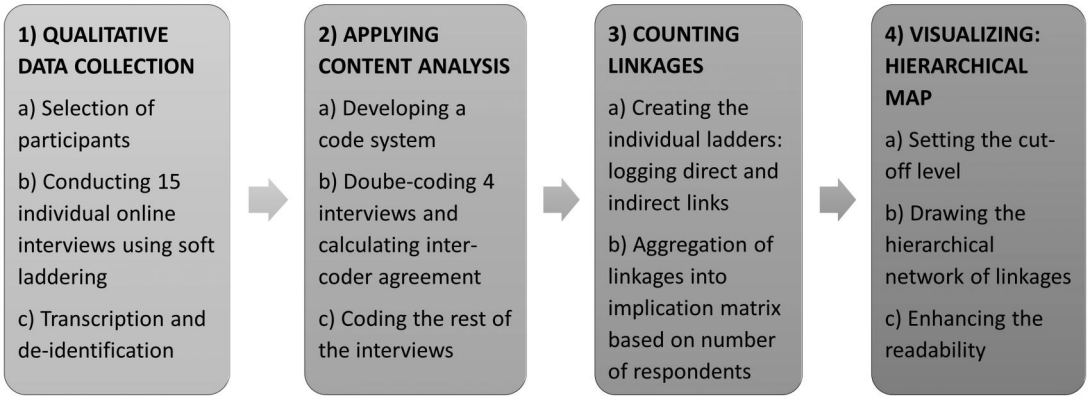

Figure 2. The steps of the means-end chain analysis which was applied to find common design strategies to create social office space.

asked to explain how they had approached the social goals of the project. The interviews followed the natural course of the conversation about design decisions, guided by many 'why'-questions from the researcher to uncover underlying motives and probe more abstract reasons. This technique is known as soft laddering, which refers to the construction of 'ladders' from concrete to abstract concepts. When participants have substantial familiarity with the issue, as in our study, soft laddering, which allows participants to express their thoughts and motivations in their own words, is considered to result in much richer data than hard laddering, which uses pre-coded concepts (Miles and Rowe 2004). The laddering technique focuses on the identification and connection of concepts at three main levels: attributes, consequences, and values (Olson and Reynolds 2001).

3.1.3. Transcription and de-identification

The interviews took place in November and December 2021 and lasted 35 to 65 minutes. Due to COVID-19 restrictions, all interviews were conducted online by the first author, recorded, and transcribed using MS Office 365 and Amberscript. They were de-identified by removing names and geographic locations and generalising references to the organisation's activities. After fifteen interviews, thematic saturation was reached.

3.2. Content analysis

3.2.1. Code system

For the analysis of interview transcriptions, we used Atlas.ti 22 software. Following the laddering technique, the first step involved identifying meaningful attributes that were considered as competitive choice alternatives for designers. Descriptive codes for relevant design attributes, such as "furniture" and "colour use", were defined based on the interior designer's palette mentioned in section 2.2. In the second step, codes for affordances and higher-end goals were established through content analysis of a random sample of seven interviews out of fifteen. The initial code system was developed by the first author and refined based on feedback from two independent workplace researchers who coded the same four interviews and discussed differences. This process ensured a balanced and representative code system capturing the key design aspects discussed by the interviewees.

3.2.2. Inter-coder agreement

Before coding the whole set of interviews, the reliability of the code system was tested by having two researchers who were not involved in the study before apply it to four randomly selected interviews. This test sample contained 32% of all quotations that were predefined by the first author. The independent coders were carefully instructed and minor changes to the code descriptions and length of quotations were made after their first attempt. In the second round of coding their inter-coder agreement was acceptable with Krippendorff's $_{Cu}\alpha$ 0,877. This means that 87.7% of the data were coded to a degree better than chance (Friese 2019, p. 280). Subsequently, the remaining transcriptions were divided between them for the final coding of the pre-defined quotations. Appendix A presents the final code system including the code descriptions. Queries in Atlas.ti were used to retrieve quotations relating to specific codes and code combinations.

3.3. Counting linkages

3.3.1. From codes to implications

To construct a hierarchical map of joint design strategies for social office space, first the connections between different codes, referred to as "linkages" or implications, were identified. These linkages were established by analysing explicit mentions of concepts found in the interviews. To ensure agreement among coders, certain statements were divided into multiple quotations to prevent the co-occurrence of codes from the same category. By examining the thematic orientation of these quotations and the designers' reasoning, it was possible to reconnect passages and establish horizontal linkages between codes which indicate choices made for the simultaneous application of design attributes.

3.3.2. Aggregation across participants

When aggregating the data across participants, we made the assumption that the reasoning behind the selection of design attributes would remain consistent for each individual. This assumption was supported by the fact that designers repeated their arguments during the interviews and across various projects. Additionally, the content analysis revealed that designers more frequently attributed their choices to personal beliefs and expertise (192 quotations) rather than project-related factors such as client preferences ($n = 83$), organisational culture ($n = 35$), or ($n = 51$) budget constraints and building limitations ($n = 51$). Consequently, we analysed the linkages based on the number of respondents rather than the frequency of

the linkages, thereby prioritising commonly shared reasoning over context-specific design solutions.

To facilitate this analysis, the linkages were logged in an Excel datasheet and subsequently aggregated across participants. Python programming language was employed to create a summary implication matrix (Appendix B), which depicted the frequency with which each code led to any other code. Additionally, the total number of linkages was calculated. Throughout the aggregation process, duplicate linkages within participants were eliminated to ensure accuracy.

3.4. Creating the hierarchical map

To visualise the relationships between concepts, we created a hierarchical map using NodeXL, as suggested by Foolen-Torgerson and Kilwinger (2021). To distinguish dominant from incidental linkages, we set a threshold for relationships to be included in the map. Because preserving approximately 70% of the common implications in the hierarchical map is considered a good fit (Reynolds and Phillips 2008) we included all relationships that were mentioned by at least three participants. Increasing the threshold increased readability but simultaneously reduced the reliability of the map (see Appendix B). The readability of the map was further improved by repositioning the concepts at four horizontal levels, preventing crossing lines as much as possible, and varying the line styles according to the number of linkages.

The means-end chain analysis focused on stated design decisions which were related to social well-being. Additional motives for applying design attributes or affordances brought forward in the interviews included explicit client preferences, restrictions or opportunities of the budget or the existing building, and other strategic goals, such as recruitment.

4. Results

4.1. Hierarchical map of design strategies

The relationships between the different design elements and desired outcomes can be organised in a hierarchical manner. This hierarchical map consists of design attributes, affordances, and higher-order goals that guide the designers in their approach to enhancing social well-being. Figure 3 provides a visual representation of the design attributes that were mentioned by at least three of the 15 designers as a means to achieve the desired goals. According to the designers, these attributes contributed to the creation of affordances, which in turn facilitated the accomplishment of design objectives.

The map captures a substantial portion (71.6%) of the 493 direct connections that were logged among the 22 concepts. It reveals that the designers primarily focus on two main aspects of social well-being: fostering a sense of connectedness among employees (see section 4.2) and enabling informal social interactions (section 4.3). To achieve these aims, they discuss ten different types of design attributes, ranging from colour use to the strategic placement of specific equipment. In most cases, the design attributes and higher-order goals are linked through the creation of affordances. This indicates that the creation of affordances plays a crucial role in the interior design process. The data indicated ten distinct types of social affordances. Detailed descriptions of the concepts can be found in Appendix A.

The map shows two exceptions to the means-end chains that include affordances: (a) the straight grey line between *Size & shape* and *Informal interactions*, which refers to literally creating room for gathering, and (b) the dashed line between *Spatial organisation* and *Informal interactions*, which refers to centralising spaces for interaction to create a social hub that guarantees bumping into each other. In several cases, the designer's strategy does not extend beyond creating affordances and lacks a relation with a higher-order goal, which is indicated by black lines between design attributes and affordances that continue to the higher level in grey (see Appendix B for the number of linkages). This is illustrated by the close attention to *Choice and flexibility, Cosiness,* and *Comfort* that do not result in equally strong connections with connectedness or social interactions. Four affordances (*Visibility*, *Choice & flexibility*, *Cosiness*, and *Social facilities*) are related to both higher-order goals while the remaining affordances target only one of them.

Among the affordances that were put forward by the designers, two abstraction levels may be identified. The lower row (see Figure 3) consists of concrete functional affordances that may directly guide user behaviour. These include *visibility* of people, *choice* options and *flexibility* in use, physical *enclosure* of spaces, *social facilities*, such as breakout spaces and kitchen areas, and walking *routes* and *destinations* that facilitate encounters. These affordances are all connected to the goal of stimulating *social interactions*. Additionally, providing *social facilities* is connected to *bonding*.

The upper row shows the more abstract psychological affordances that aim to evoke sensory or emotional experiences rather than offering action possibilities. These include the *visual identity* of a space that communicates values, symbolic *demarcation* of social areas, *cosiness*, which refers to a friendly

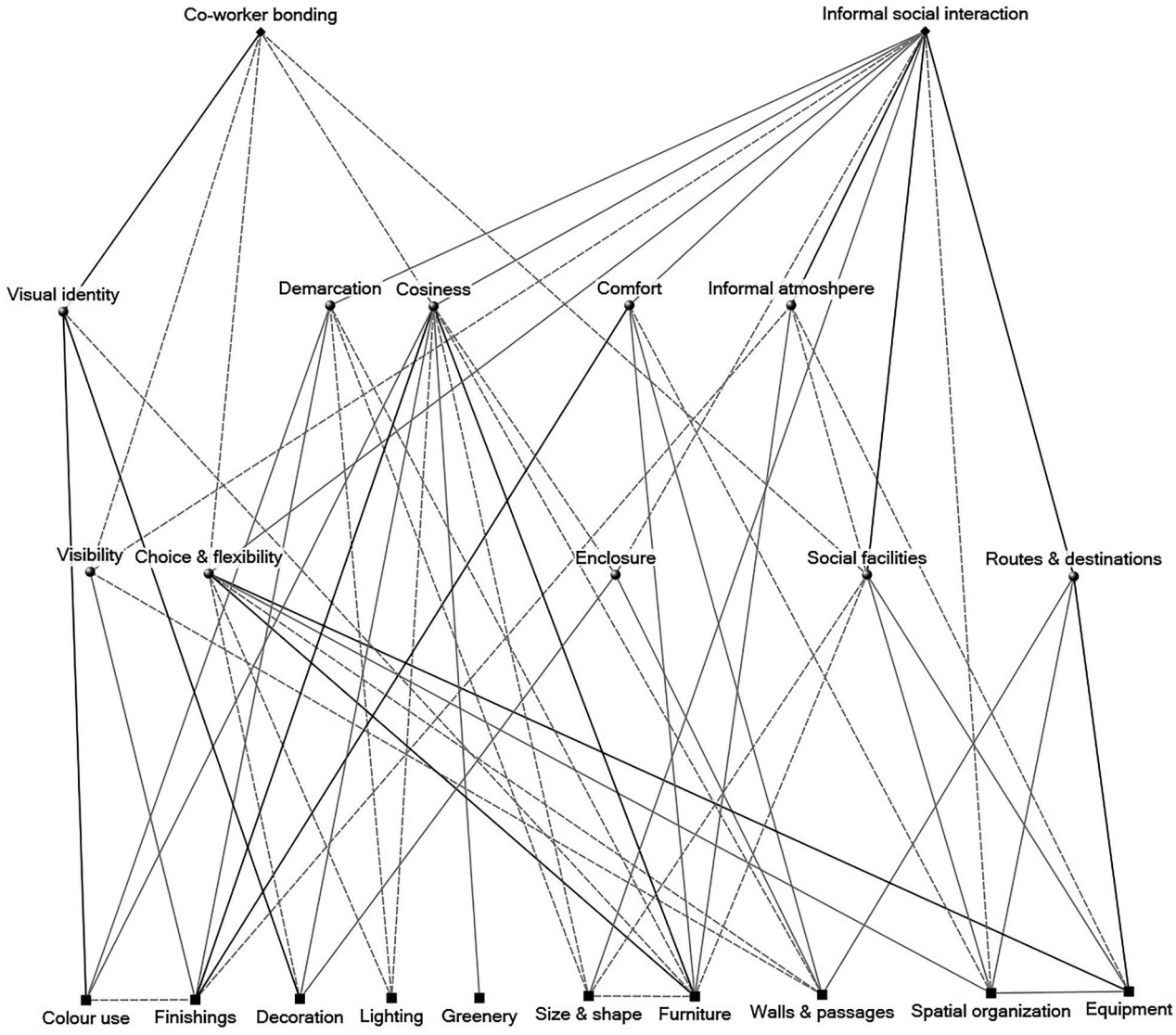

Figure 3. Hierarchical map of the interior designer's strategies, showing the direct linkages (cut-off = 3) between design attributes (■) at the bottom, affordances (●) in the middle, and goals (◆) at the top. Black line = ≥ 8 linkages; solid grey line = 5-7 linkages; dashed line = 3-4 linkages.

atmosphere and sense of security, the experience of *comfort*, for example, softness and good acoustics, and an *informal* and playful *atmosphere* that invites people to interact. These higher-level affordances generally have a stronger connection with the higher-order goals than the ones at the lower level. However, there are no linkages between the two affordance levels, except for the minor linkages between *Enclosure* and *Cosiness*, referring to intimate spaces, and between *Social facilities* and *Informal atmosphere*, which refers to creating lunch areas and breakout spaces.

According to interior designers, the most important attributes for supporting social well-being were *Furniture* and *Finishings*, followed by *Equipment* and *Decoration*. Artificial *lighting* was of minor importance and limited to the potential of lighting fixtures to offer adjustability and a spatial focal point and communicate cosiness by their style. *Greenery* was used almost solely to increase cosiness. Although *colour* is a prominent visual attribute of interior design, it seems to be of limited strategic value for supporting social well-being and was predominantly used to create identity and demarcation and to contribute to cosiness. The spatial design, including *Walls & passages* and *Spatial Organisation*, mainly served social interactions. The following sections explain how the design attributes were used in the strategies.

4.2. Design strategies to support connectedness

The higher-order design goal labelled *Connectedness* refers to the designers' aim to support social cohesion and a sense of community. Figure 3 shows that the

participants applied five design strategies to achieve this goal: creating *Visual identity,* people *Visibility, Choice & flexibility*, *Cosiness*, and *Social facilities*. In this section, we explain how and why they created these affordances.

4.2.1. Creating a visual identity

The most practised strategy for connectedness was visualising the identity of the organisation in the interior design. Often, corporate colours were used for wall finishings, furniture, and other objects to indicate corporate identity. Additionally, logos, keywords from mission statements, and illustrations of the organisation's primary process were used as decoration, for example, by prints on window films. Participant #3 told of a term referring to a running gag that was shaped in neon light. "It will be fantastic if you enter with a visitor, consultant, or new employee and you have to explain this."

Furthermore, art collections and objects that were meaningful to the organisation were incorporated into the new interior design. In one of the projects, cast-off working clothes and dissembled products of the organisation were used as finish materials. The visualisation mostly aimed to express the general identity of the organisation, but in some cases, the decoration represented the place of business or colour variety was used to distinguish the different team areas and create group identity.

4.2.2. Creating people visibility

A second strategy for connectedness focused on the visibility of people by using transparent materials, such as glass walls, and by spatial openness which offers sight lines. One designer argued that visibility would reduce anonymity and alienation because when employees are seen by others, for example when entering the office, it would make them feel part of a group. The designers believed that seeing others increases awareness of their presence and thereby supports connectedness. As participant #11 explained: "When you sit down here for a minute, you can see those colleagues and are reminded of the fact that you are all working for the same company." Material transparency was also used to make a visual connection between spaces and their occupants, emphasising their relationship and preventing them from feeling locked up.

4.2.3. Offering choice and flexibility

The designers argued that offering built-in possibilities for customising and personalisation would increase bonding because they support getting to know each other. They created opportunities for personal announcements, such as birth cards, and invitations for social activities by applying a variety of displays, from notice boards (*Equipment*) to show-cases (*Furniture*). At a more abstract level, some designers assumed that possibilities for the user to control the environment and choose between different spaces or different seating arrangements were basic needs which had to be satisfied to establish the psychological safety that allows for building personal relationships.

4.2.4. Providing cosy spaces

Several designers recognised the employees' need for withdrawal from the bustle and argued that providing shelter may increase the psychological safety required for sincere conversations. An intimate atmosphere was assumed to support peace of mind that allows for an open conversation with an office colleague and taking the time to discuss personal issues. Based on the wide array of design attributes that were used to create cosiness, this was the most complex and multi-faceted affordance. It also was the most discussed affordance, along with choice and flexibility.

Cosiness was created by using warm, more saturated, and darker *colours*, semi-transparent, natural-looking, and tactile *finishings*, *decorations,* such as rugs, cushions, curtains, and window film, diffuse and warm-white *lighting* and lighting fixtures with soft-looking lampshades, *greenery*, natural *shapes* and downsizing spaces, homely and upholstered *furniture* such as bookcases, armchairs, and couches. "I think that a visible wardrobe expresses: 'Well, you can linger here, take off your coat, come in, and feel welcome'" (participant #5). Furthermore, the designers aim for cosiness creating *enclosure* with *walls*, plants or furniture, that covers the user's back. "Seating in an alcove feels safer and more pleasant than a bench against a wall. A bench against a wall protrudes, you can't hide, you're very much in sight. Sitting in an alcove provides protection, only your legs stick out" (participant #11). Several designers explain the observed popularity of enclosed "train seats" by the cosiness and privacy they offer without being completely separated from the social environment.

4.2.5. Accommodating group activities

A small minority of the designers related the offering of social facilities to supporting connectedness. They aimed to support social gatherings, such as having cake or drinks together to celebrate birthdays and

work successes, by including a work café or canteen featuring proper furniture for these activities. In one of the projects, the design provided showers to allow employees to join the organisation's informal sports groups during their breaks.

4.3. Design strategies to stimulate informal social interactions

The goal of stimulating spontaneous and informal social interactions featured a more prominent role in the interviews than supporting connectedness. The 11 identified strategies to increase social interactions (see Figure 3) aimed to increase eye contact and bumping into each other, lead office workers to spaces that are designed for social activities, and nudge them to linger to further increase the chance of spontaneous conversations.

4.3.1. Creating walking routes and destinations

The most prominent strategy to stimulate informal social interactions was bringing people together by directing the traffic flows within the building and offering social destinations. The *spatial organisation*, for example, grouping social spaces adjacent to workspaces, was used to create movement and direct office workers towards a central hub. Walking routes were manipulated through the positioning of *walls and passages*. Destinations were created by applying and strategically positioning *equipment*, such as coffee machines, printers, and lockers. "Casual encounters are even more important [than work-related meetings]. Therefore the photocopier is not positioned in the corridor but has been placed in a niche here [in the central area]. So everyone meets each other here, whether they like it or not" (participant #9).

4.3.2. Offering facilities for social activities

A variety of breakout spaces was designed for eating, drinking, and playing together. The most important components of this affordance were *Equipment,* such as coffee machines and games, and *Spatial organisation*, referring to the central position or clustering of this equipment, which explains the horizontal connection between the two attributes (Figure 3). Four designers used *furniture* to create a social facility, such as lounge seats, a bar, or a large kitchen table. "The bar and stools were intended to make people linger, for example at Friday afternoon drinks, instead of just grabbing something and leaving" (participant #8). The use of *Size & shape* to create social facilities refers to the spatial capacity to accommodate large social gatherings or stopping for a chat in traffic zones.

Four designers explicitly state that social facilities create an informal atmosphere by communicating possibilities for social activities.

4.3.3. Visibility of people and destinations

To support social interactions, the designers created transparent and open spaces where users would be literally and symbolically accessible, communicating their availability for interaction. "Here, the kitchen is the focal point of the social area. […] Eating and drinking brings people together, therefore a kitchen like this is very important. We did not want to hide it […] but proudly show it." (participant #7). Since eye contact was believed to elicit conversations, they often used glass walls for meeting rooms and workspaces.

4.3.4. Creating an informal atmosphere

In the breakout spaces, the designers created a lively and playful atmosphere to invite users to socialise and communicate the permission to talk, being at a location where one would not disturb others. The most important attribute for expressing informality and playfulness was *Furniture*, for example, lounge seating, alcove seats, decorative chairs, bookcases, pouffes, and standing tables, which were often combined with homely accessories, such as rugs or table lamps. When explaining their choice of furniture for breakout spaces, five designers referred to body positions that may support informal conversations, such as hanging out at the bar and sagging on the sofa. Furthermore, *Equipment*, such as television screens, coffee machines and table games were used to directly create an informal atmosphere or indirectly through the planning of breakout spaces (*Social facilities*). Four designers used *Finishings* like wood and ceramic tiles to create an informal atmosphere, for example by referring to beach life and coffee bars. Other strategies were designing a printed wallpaper with hidden surprises to trigger conversations and removing the pre-fabric ceiling to degrade the corporate look. Remarkably, decoration was rather used to create cosiness and identity than to communicate playfulness.

4.3.5. Demarcation of social spaces

To indicate where it is appropriate to socialise, the designers not only considered the features of social space itself but also its boundaries and contrast with spaces for focus work and formal meetings. For this demarcation, the designers mainly used *colour* in different shades or degrees of colourfulness and *finishings*, for example, soft versus hard flooring. Three designers used contrasting *furniture* to demarcate

functionalities, for example, sofas versus office chairs and a playful versus rigid seating arrangement. Three designers used *lighting*, for example, downlights to highlight a spot for gathering and underline the difference with standard office lighting. Four designers demarcated functions by morphology or room size.

4.3.6. Cosiness, enclosure, and comfort

In addition to stimulating spontaneous encounters and highlighting interaction opportunities, the designers also wanted to support personal conversations by offering physical and psychological comfort. They created spatial intimacy through physical and visual *enclosure* using solid *walls* and *decorations* like curtains and window foil. This architectural privacy was considered to contribute to a sense of shelter (*cosiness*, see 4.2). To make people feel comfortable and at ease and reduce concern about bothering others or being overheard, the designers used sound-absorbing *finishings*, upholstered seats and privacy screens. They distanced the social spaces from quiet zones and separated them by walls, which in some cases were placed only after neighbouring office workers had complained about the noise.

4.3.7. Choice and flexibility

Providing the users with a range of settings and possibilities for adjusting the environment to their needs is the most discussed affordance. This diversity predominantly serves to accommodate a variety of social interactions that depend on mood, conversation topic, or group size. *Furniture* and *equipment* are the most important means to create functional diversity while *decoration* is used to create aesthetic diversity and adjustable *lighting* provides user control. "To provide a choice whether to sit here or further down the building, what type of seat, sitting high or low, in a closed, enclosed, or open space. This makes people feel comfortable, which, I assume, will enable connecting to others" (participant #15).

5. Discussion and conclusions

Designing for well-being in the future of work is a major concern (Bentley et al. 2021), especially with the rise of remote and hybrid working. The office spaces of the future will need to promote in-person interaction and create a sense of community to support employees' social well-being. This study aimed to uncover designers' strategies for creating such social spaces and identify the key affordances involved.

To create social offices, workplace designers primarily focus on stimulating informal interactions. Positive encounters and socialising are seen as the foundation for building relationships. Additionally, they recognise the importance of connectedness in the physical working environment (Sander, Caza, and Jordan 2019). They aim to foster a sense of community and provide privacy for confidential conversations to ensure employees feel comfortable and not disruptive to others.

Affordances play a crucial role in the designers' strategies, connecting design attributes to user-centred project goals by creating functionalities and communicating appropriate use. The linkages between design attributes and affordances are abundant, indicating their significance. However, the linkages between affordances and strategic goals are less prominent. This may be attributed to the natural flow of conversation in the interviews, where frequent repetition of distant goals may not be obvious. Another explanation could be that in these cases, designers were influenced by personal beliefs that were intuitively related to social goals, such as supporting general well-being, or by explicit preferences expressed by clients regarding specific design attributes or affordances.

The type of affordances highlighted by the designers seems to confirm the expected two levels of abstraction, distinguishing between functional and psychological affordances. This corresponds to a design's communication of its primary, practical functions and its secondary, symbolic functions (Muller 2003, p. 334–337). However, there is a lack of linkages between these two levels, suggesting that the designers themselves may not explicitly differentiate between concrete functional and more abstract psychological affordances. It is important to note that these missing linkages may also be a result of content analysis techniques employed to calculate inter-coder agreement, which required coders to choose the most prominent affordance in a quotation, thereby avoiding co-occurrence within a category.

In line with space syntax theory (Hillier and Hanson 1984), designers' strategies for increasing social interaction in offices emphasise the importance of physical openness and spatial integration of social areas. However, these strategies also underscore the significance of visual communication and the role of furniture and equipment in stimulating informal interaction. This emphasises that facilitating movement is only one aspect, while the communication of meaning and providing comfort for lingering (Fayard

and Weeks 2007; Spreitzer, Bacevice, and Garrett 2020; Tann and Ayoko 2020) are equally important factors. An informal atmosphere can be considered a behavioural setting (Barker, 1968) that communicates the acceptability of informal interaction. The identified design attributes primarily focus on furnishings, including furniture, decoration, greenery, and equipment, with a multi-sensory approach encompassing visual, auditive, and tactile experiences. Furnishings are considered the core of interior design and distinguish it from architecture that places greater emphasis on spatial structure and technical solutions.

The designers' stated use of artificial lighting primarily revolved around the visual appearance and adjustability of lighting fixtures with less attention given to light levels and technology that determines light quality. This discrepancy may be attributed to the limited in-depth study of lighting in interior design programs (Reddy, Humphries Stewart, and Fortenberry 2021) and a less obvious relationship with social behaviour, although indoor lighting has a known impact on mood and social functioning (Küller et al. 2006; van Duijnhoven et al. 2019). The potential of greenery in office spaces is also underutilised, as plants can contribute to privacy, acoustic comfort, and positive mood (Aydogan and Cerone 2021).

The identified affordances reflect a broad view of social office space that aligns with organisational literature. They align with design elements indicated by Spreitzer, Bacevice, and Garrett (2020) as being supportive of pro-social behaviour and a sense of community, such as social facilities, visual identity, and affective affordances which promote generosity and caring. However, the interviewees' focus is on general connectedness and organisational identity rather than team cohesion and individual expression. Strict hot-desking policies that discourage territorial markers may influence this emphasis. Technologies could offer flexible personalisation to support individual well-being in these aspects.

5.1. Practical implications

The developed code system and hierarchical map in this study have practical implications for interior office design. The code system provides definitions of essential concepts, facilitating mutual understanding in this multidisciplinary field. The mental map visualises the designers' decisions, which are often made intuitively and not explicitly. These tools can be used to discuss design solutions that meet the clients' desires for social well-being in the workplace. By focusing on the desired affordances and leveraging the expertise of interior designers, these discussions can lead to effective design solutions. Additionally, the identified strategies can inspire and educate less experienced designers who are working on creating office spaces that promote well-being in new ways of working, such as hybrid and activity-based models.

5.2. Implications for science

The means-end chain analysis employed in this study proved useful in uncovering the implicit and intuitive strategies of workplace designers. However, the linkages with higher-order goals were relatively weak. It is unclear whether this is due to designers focusing primarily on affordances or the limitations of the soft-laddering approach, which did not emphasise repeated connections with higher-order goals. This study contributes to the conceptualisation of office design by identifying design parameters that not only enable specific behaviours but also encourage the use of specific spaces. This is important for systematic investigations into the effects of office design on behaviour and well-being (Sugiyama et al. 2021). The findings extend the theory of affordances (Gibson 1977) into the domain of the work environment, with a specific focus on facilitating social behaviour among office users.

5.3. Limitations and future research

This study represents an initial step in defining social affordances in interior office space from the designer's perspective. To strengthen the findings, further research should involve a larger number of office projects, a wider variety of workplace designers, and cross-cultural comparisons. The use of triangulation can further enhance the robustness of the findings. Additionally, the fragmentation of rich interview statements compromised the identification of means-end chains. Future studies could explore qualitative approaches to establish the reliability of content analysis through discussions among multiple independent researchers.

It is important to note that the affordances identified in this study are based on the designers' assumptions. Designers can intend to guide behaviour in a certain way but users can choose to do something else or the design may not perform as expected (Søiland 2021). Furthermore, there may be a discrepancy between the designer's memory and their actual strategy at the time. Therefore, it is essential to

confirm whether users indeed perceive these affordances and increase their connectedness and informal interaction. Correlational studies and experiments can be conducted to test each hypothesis represented in the hierarchical map, serving as a foundation for the further development of workplace design theory. It is crucial to bridge the gap between designers' intentions and users' experiences in order to create truly effective and user-centred office environments.

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Data availability statement

The de-identified data that support the findings of this study and the script that was used for analysis are openly available in the 4TU Research Data repository at http://doi.org/tudelft.idm.oclc.org/10.4121.22099883.

References

Aydogan, A., and R. Cerone. 2021. "Review of the Effects of Plants on Indoor Environments." *Indoor and Built Environment 30* (4): 442–460. doi:10.1177/1420326X19900213.

Babapour Chafi, M., A. Hultberg, N. Bozic Yams, H. Molina-Sánchez, G. Giorgi, D. C. Guajardo, and A. Ariza-Montes. 2021. "Post-Pandemic Office Work: Perceived Challenges and Opportunities for a Sustainable Work Environment." *Sustainability 14* (1): 294. doi:10.3390/su14010294.

Barker, R.G. 1968. *Ecological Psychology*. Redwood City, CA: Stanford University Press.

Becker, F. D. 2004. *Offices at Work : uncommon Workspace Strategies That Add Value and Improve Performance* (1st ed.). Hoboken: John Wiley & Sons.

Bentley, T., N. Green, D. Tappin, and R. Haslam. 2021. "State of Science: The Future of Work – Ergonomics and Human Factors Contributions to the Field." *Ergonomics 64* (4): 427–439. doi:10.1080/00140139.2020.1841308.

Boradkar, P. 2010. "Design as Problem Solving." In *The Oxford Handbook of Interdisciplinarity*, edited by R. Frodeman, 273–287. Oxford: Oxford University Press.

Brand, S. 1994. *How Buildings Learn: What Happens after They're Built*. New York: Penguin Books.

Ching, F. D. K., and C. Binggeli. 2018. *Interior Design Illustrated*, 4th ed. Hoboken: Wiley.

Colenberg, S., R. Appel-Meulenbroek, N. Romero Herrera, and D. Keyson. 2021. "Conceptualization of Social Well-Being in Activity-Based Offices." *Journal of Managerial Psychology 36* (4): 327–343. doi:10.1108/JMP-09-2019-0529.

Colenberg, S., and D. Keyson. 2021. "Expected User Needs towards the post-Covid Office: better Support of Social Interactions and Concentration." In *The 20th EuroFM Research Symposium 16-17 June 2021. Research Papers*, edited by T. Jylhä, 23–28. The Hague: EuroFM. https://eurofm.org/2021/06/14/proceedings-20th-eurofm-research-symposium/.

Deci, E. L., and R. M. Ryan. 2008. "Self-Determination Theory: A Macrotheory of Human Motivation, Development, and Health." *Canadian Psychology / Psychologie Canadienne 49* (3): 182–185. doi:10.1037/a0012801.

Dutch Architects' Title Act [Wet op de architectentitel], Staatsblad. 2021. https://wetten.overheid.nl/BWBR0004189/2021-08-26#HoofdstukIV

Dutch Architects' Title Act, Government Gazette. 2021. https://wetten.overheid.nl/BWBR004189/2021-08-26#HoofdstukIV

Fayard, A.-L, and J. Weeks. 2007. "Photocopiers and Water-Coolers: The Affordances of Informal Interaction." *Organization Studies 28* (5): 605–634. doi:10.1177/0170840606068310.

Fisher, C. D. 2014. "Conceptualizing and Measuring Wellbeing at Work." In *Wellbeing: A Complete Reference Guide, Work and Wellbeing*, edited by P. Y Chen & C. L. Cooper, 9–34. Chichester, West Sussex: Wiley Blackwell. doi:10.1002/9781118539415.wbwell018.

Foolen-Torgerson, K. L., and F. B. M. Kilwinger. 2021. *User Guide to Means-End Chain Analysis: The Data Analysis Manual*. Lima: CGIAR Research Program on Roots, Tubers and Bananas (RTB). doi:10.21223/XLWLBM.

Friese, S. 2019. *Qualitative Data Analysis with Atlas.ti*. 3rd ed. London: SAGE.

Gensler Research Institute. 2020. *Back to the Office. U.S. Work from home Survey 2020*. https://www.gensler.com/gri/uk-workplace-survey-2020

Gibson, J. J. 1977. "The Theory of Affordances." In *The Ecological Approach to Visual Perception*, edited by R. E. Shaw & J. Bransford, 67–82. Hillsdale: Lawrence Erlbaum.

Gifford, R. 2014. *Environmental Psychology: Principles and Practice*. 5th ed. Colville: Optimal Books.

Gutman, J. 1982. "A Means-End Chain Model Based on Consumer Categorization Processes." *Journal of Marketing 46* (2): 60–72. doi:10.1177/002224298204600207.

Heebels, B., and R. C. Kloosterman. 2016. *Van binnen naar buiten. Een onderzoek naar de rol van de wettelijke titelbescherming voor interieurarchitecten*. https://www.college-vanrijksadviseurs.nl/adviezen-publicaties/brieven/2016/07/06/van-binnen-naar-buiten-een-onderzoek-naar-de-rol-van-de-wettelijke-titelbescherming-voor-interieurarchitecten

Hillier, B., and J. Hanson. 1984. *The Social Logic of Space*. Cambridge: Cambridge University Press.

Jensen, P. A., and T. J. M. van der Voordt. 2019. "Healthy Workplaces: What We Know and What Else We Need to Know." *Journal of Corporate Real Estate 22* (2): 95–112. doi:10.1108/JCRE-11-2018-0045.

JLL Global Research. 2022. *The Future of Work Survey 2022: Five Critical Challenges Ahead for Real Estate*. https://www.jll.co.uk/content/dam/jll-com/documents/pdf/research/global/jll-future-of-work-survey-2022-v1.pdf

Kilwinger, F. B. M., and Y. K. van Dam. 2021. "Methodological Considerations on the Means-End Chain Analysis Revisited." *Psychology & Marketing 38* (9): 1513–1524. doi:10.1002/mar.21521.

Kim, J., and R. de Dear. 2013. "Workspace Satisfaction: The Privacy-Communication Trade-off in Open-Plan Offices." *Journal of Environmental Psychology 36*: 18–26. doi:10.1016/j.jenvp.2013.06.007.

Kropman, D., R. Appel-Meulenbroek, L. Bergefurt, and P. LeBlanc. 2023. "The Business Case for a Healthy Office; a Holistic Overview of Relations between Office Workspace Design and Mental Health." *Ergonomics* 66 (5): 658–675. doi:10.1080/00140139.2022.2108905.

Küller, R., S. Ballal, T. Laike, B. Mikellides, G. Tonello, L. Thorbjörn, B. Mikellides, and G. Tonello. 2006. "The Impact of Light and Colour on Psychological Mood: A Cross-Cultural Study of Indoor Work Environments." *Ergonomics 49* (14): 1496–1507. doi:10.1080/00140130600858142.

Leesman. 2022. *Purposeful Presence. How and Why Employees Return*. https://www.leesmanindex.com/purposeful-presence/

Marinucci, M., L. Pancani, N. Aureli, and P. Riva. 2022. "Online Social Connections as Surrogates of Face-to-Face Interactions: A Longitudinal Study under Covid-19 Isolation." *Computers in Human Behavior 128*: 107102. doi:10.1016/j.chb.2021.107102.

Marzban, S., I. Durakovic, C. Candido, and M. Mackey. 2021. "Learning to Work from Home: Experience of Australian Workers and Organizational Representatives during the First Covid-19 Lockdowns." *Journal of Corporate Real Estate 23* (3): 203–222. doi:10.1108/JCRE-10-2020-0049.

Meel, J. van. 2000. *The European Office: Office Design and National Context*. Rotterdam: 010 Publishers.

Miles, S., and G. Rowe. 2004. "The Laddering Technique." In *Doing Social Psychology Research*, edited by G. M. Breakwell, 305–343. Malden: BPS Blackwell.

Muller, W. 2003. "Vormgeven: ordening en betekenisgeving" *[Order and Meaning in Design]*. Utrecht: Lemma.

Myerson, J., and P. Ross. 2003. *The 21st Century Office*. London: Laurence King Pub.

Olson, J. C., and T. J. Reynolds. 2001. "The Means-End Approach to Understanding Consumer Decision Making: Recommendations for quality metrics." *Review of Marketing Research 5*, 130–174..

Reddy, S. L., A. Humphries Stewart, and S. L. Fortenberry. 2021. "A Case for the Expansion of Lighting Design Education." *Journal of Family & Consumer Sciences 113* (1): 56–61. doi:10.14307/JFCS113.1.56.

Reis, H. T., K. M. Sheldon, S. L. Gable, J. Roscoe, and R. M. Ryan. 2000. "Daily Well-Being: The Role of Autonomy, Competence, and Relatedness." *Personality and Social Psychology Bulletin 26* (4): 419–435. doi:10.1177/0146167200266002.

Reynolds, T. J., and J. M. Phillips. 2008. "A Review and Comparative Analysisof Laddering Research Methods." *Recommendations for Quality Metrics. Review of Marketing Research 5*: 130–174.

Sailer, K., and P. Koutsolampros. 2021. "Space Syntax Theory: Understanding Human Movement, Co-Presence and Encounters in Relation to the Spatial Structure of Workplaces." In *A Handbook of Theories on Designing Alignment between People and the Office Environment*, edited by R. Appel-Meulenbroek & V. Danivska, 248–260. New York: Routledge. doi:10.1201/9781003128830.

Sander, E. J., A. Caza, and P. J. Jordan. 2019. "Psychological Perceptions Matter: Developing the Reactions to the Physical Work Environment Scale." *Building and Environment 148*: 338–347. doi:10.1016/j.buildenv.2018.11.020.

Sauer, J., A. Sonderegger, and S. Schmutz. 2020. "Usability, User Experience and Accessibility: Towards an Integrative Model." *Ergonomics 63* (10): 1207–1220. doi:10.1080/00140139.2020.1774080.

Søiland, E. 2021. "De-Scripting Office Design: exploring Design Intentions in Use." *Journal of Corporate Real Estate 23* (4): 263–277. doi:10.1108/JCRE-10-2020-0039.

Spreitzer, G., P. Bacevice, and L. Garrett. 2020. "Workplace Design, the Physical Environment, and Human Thriving at Work." In *Organizational Behaviour and the Physical Environment*, edited by O. B. Ayoko & N. M. Ashkanasy, 235–250. New York: Routledge.

Sugiyama, T., N. Hadgraft, B. K. Clark, D. W. Dunstan, A. Chevez, G. N. Healy, E. Cerin, A. D. LaMontagne, A. Shibata, K. Oka, and N. Owen. 2021. "Office Spatial Design Attributes, Sitting, and Face-to-Face Interactions: Systematic Review and Research Agenda." *Building and Environment 187*: 107426. doi:10.1016/j.buildenv.2020.107426.

Tann, K., and O. B. Ayoko. 2020. "A Social Semiotic Approach to the Physical Work Environment." In *Organizational Behavior and the Psysical Environment*, 214–231. New York: Routledge.

van Duijnhoven, J., M. P. J. Aarts, M. B. C. Aries, A. L. P. Rosemann, and H. S. M. Kort. 2019. "Systematic Review on the Interaction between Office Light Conditions and Occupational Health: Elucidating Gaps and Methodological Issues." *Indoor and Built Environment 28* (2): 152–174. doi:10.1177/1420326X17735162.

van Kempen, S., R. Mathot, and R. C. Kloosterman. 2021. "*De Ruimtelijke Ontwerpsector Ontleed*."