Multisensory design and caring architecture : the case of volume's feelings in the Orb pavilion, France

Angèle Pillot, Marie Tesson

MULTISENSORY DESIGN AND CARING ARCHITECTURE : THE CASE OF VOLUME'S FEELINGS IN THE ORB PAVILION, FRANCE

DESIGN MULTISSENSORIAL E ARQUITETURA DE CUIDADOS: O CASO DAS SENSAÇÕES DO VOLUME NO PAVILLON DE L'ORBE, FRANÇA

Abstract : This article proposes the use of multisensory design as a tool for creating caring architecture. Drawing on the works of André Bruyère, a postmodern architect with a particular interest in designing architecture as a form of supportive care, we illustrate our argument with the first author's experience of the sense of volume in the Orb Pavilion. Designed by André Bruyère, the pavilion incorporates many multisensory features. The sense of volume allows one to perceive spatial and material variations, thresholds, and the proximity of surfaces by analyzing sound reflections. By grounding our reflections in the context of atmospheres, we suggest that Bruyère designed affective affordances that enable us to connect with the building. Finally, we hypothesize that the design of multisensory affective affordances could be a key element in creating caring architecture.

Keywords : sense of volume. caring architecture. architectural atmospheres. multisensory design. sensitive experience.

Resumo: Este artigo propõe o uso do design multissensorial como uma ferramenta para criar uma arquitetura acolhedora. Com base nas obras de André Bruyère, um arquiteto pós-moderno com um interesse particular em projetar arquitetura como uma forma de cuidado de apoio, ilustramos nosso argumento com a experiência do primeiro autor

sobre a sensação de volume no Pavilhão do Orbe. Projetado por André Bruyère, o pavilhão incorpora muitas características multissensoriais. A sensação de volume permite perceber variações espaciais e materiais, limiares e a proximidade de superfícies ao analisar as reflexões sonoras. Ao fundamentar nossas reflexões no contexto das atmosferas, sugerimos que Bruyère projetou affordances afetivas que nos permitem conectar com o edifício. Finalmente, hipotetizamos que o design de affordances afetivas multissensoriais pode ser um elemento chave na criação de uma arquitetura acolhedora.

Palavras chave: sentido do volume. arquitetura cuidadosa. atmosferas arquitectónicas. conceção multissensorial. experiência sensível.

1. THE MULTISENSORY EXPERIENCE OF PLACES

Over the past three decades, there has been a growing interest in the sensory and affective experience of architecture. This interest is rooted in phenomenology, particularly in the twin concepts of ambiance and atmosphere. These concepts suggest that the character of an environment is evaluated through a complex, multisensory integration of various factors, rather than solely through visual perception, as often assumed (Zumthor, 2006).

Pallasmaa (2014) expands on this by stating that « atmospheric perception also involves judgments beyond the five Aristotelian senses, such as sensations of orientation, gravity, balance, stability, motion, duration, continuity, scale, and illumination (Pallasmaa, 2014, p.231). Therefore, the characteristics of a space are experienced in an embodied, pre-reflective manner, perceived as a diffuse whole rather than in a conscious, precise, and focused way (Pallasmaa, 2014).

When exposed to atmospheric variations, the body-in-feeling resonates with the environment. According to Griffero (2020), experiences described as « resonance » occur when individuals do not expect them and are in an appropriate state of mind. He hypothesizes that our societal model, which increasingly pulls us away from the present moment, distances us from, or even deprives us of, this resonance. While resonance can affect our mental states in either pleasant or unpleasant ways, its absence could be unnatural and harmful. Immersed in the environment, emotional resonance arises from ecological qualities known as affective affordances (Griffero, 2020).

Atmospheric experience is inherently multisensory, and resonance with the environment is essential for our internal balance. But what occurs in a sensory-deprived environment, where aesthetics are predominantly designed for sight, thereby limiting the body's diverse sensory experiences? In this article, we argue for the necessity of investigating multisensory design as a tool for creating caring architecture. To ground our proposal in concrete and embodied elements, we present the specific case of experiencing the sense of volume in André Bruyère's Orb Pavilion. Consequently, the following sections will present André Bruyère's multisensory approach, the Orb Pavilion, the concept of volume perception, and *the first author's* experience of volume within the pavilion.

2. THE MULTISENSORY APPROACH OF ANDRÉ BRUYÈRE

The work of André Bruyère (1917-1998), a French architect, stands out as a unique embodiment of the emerging postmodern awareness of the critical connection between architecture and human welfare. Bruyère holds a deep conviction that architectural tenderness and consideration, significantly contribute to the experiences of those who frequent the space (Bruyère, 1968). He developed an observational practice grounded in his personal experiences with existing spaces and a keen awareness of others' experiences, demonstrating a high sensitivity to situations of vulnerability.

André Bruyère's architecture engages multiple senses, moving beyond visual aesthetics to prioritize and combine diverse modes of perception. His designs are distinctly multisensory, addressing hearing with specific musicalities and areas for silence, touch with tactile materials, smell with aromatic plants and fragrance dispensers, taste through small kitchen designs, and sight with carefully curated spatial discoveries. While his notes (Bruyère, n.d.) outline these sensory considerations, they do not fully capture the comprehensive richness evident in his drawings and spaces, which include additional multisensory elements.

Much of his intentions come from an attentive observation of people and contexts. André Bruyère spends time on site, taking notes, experiencing places with his body, and observing and listening to others. He also document himself through literature and discussions with experts, including psychologists or doctors.

André Bruyère's work prompts questions about whether a multisensory aesthetic could enhance well-being through positive affective outcomes. Employing a method akin to action research, he empirically explored using sensory variables to create architecture that supports care. This approach led him to develop architectural elements aimed at promoting well-being. The Orb Pavilion, discussed further, embodies the latest iteration of these principles.

3. THE ORB PAVILION (FRANCE)

The Orb Pavilion, inaugurated in 1991 in Ivry-sur-Seine, was designed in response to a call for end-of-life care proposals by the AP-HP (Public Hospitals of Paris) in 1986. It provides care for individuals suffering from various pathologies and disabilities, particularly those facing advanced age and progressive loss of autonomy. At the inception of the building, the majority of residents are women, half of whom have mental illness. The facility sees a monthly mortality rate of 5%. While some residents maintain mobility and speech, others have lost these abilities. Many spend their remaining time in the institution, receiving dedicated care from a medical and paramedical team.

André Bruyère formed a diverse team, including a lawyer, doctor, engineers, journalist, and philosopher, to design an 86-bed unit at Hôpital Charles-Foix in Ivry-sur-Seine (cf. Choussat, Gille 1988). The Orb Pavilion's design departed from the Napoleonic hospital style, rejecting orthogonality. Bruyère addressed spatial dysfunctions after spending a day and night in the existing ward. He focused on rectilinear corridors and door alignments that created sensory discomfort and a lack of hope, aiming to foster perspectives, exchanges, and connections to the outside world (Bruyère, 1986).

Building on these insights and previous architectural considerations, André Bruyère and his team proposed a single-story structure that opens onto gardens and is organized to evoke a forest. The design features pathways, clearings, and spaces varying between shelter and openness, offering a spatially rich experience with diverse ceiling heights, widths, openings, and levels of privacy. This interconnected space allows easy access to various points while providing secluded areas for tranquility, yet remains integrated with crossroads and gathering spots. The

architectural vision of the Orb Pavilion aims to enhance the well-being of both patients and caregivers.

The Orb includes scent diffusers, speakers, two gardens with fruit trees, a fireplace, and a private kitchen for use with relatives. It offers various spaces with different layouts, levels of privacy, and sizes for tea or lunch. Quiet window areas connect to the garden, and the hall features a weather vane and a double water point. Initially adorned in orange and ochre tones, the Orb combines carpets with walls of brick, concrete, and plaster.

The architectural elements manipulated in the Orb Pavilion can be categorized by the senses they engage (touch, smell, etc.) or the modes they affect (texture, spatiality, color, etc.). This study specifically explores the sense of volume, a perceptual aspect influenced significantly by architectural design choices.

4. THE SENSE OF VOLUME

The sense of volume [sens des masses], a term used by visually non-sighted individuals and professionals in visual impairment, refers to the ability to detect and locate solids and voids in one's surroundings. Currently, this concept lacks a formal scientific definition (Pillot et al., 2023). It is mainly associated with echolocation, where individuals analyze sound reflections in their environment (Pigeon, 2012; Norman and Thaler, 2017). However, it likely involves other senses as well (Ammons et al., 1953).

Although traditionally used by non-sighted individuals for navigation, Pillot and colleagues (2024) shows that blindfolded sighted individuals quickly perceive sensations of volume. This indicates these sensations exist in a pre-reflective state, enhancing the overall sensory experience, including atmospheres.

Our understanding of the sense of volume comes from in vitro experiments with precise but less ecologically valid stimuli and urban environment studies (Pillot et al., 2023). It has never been studied at the architectural scale.

Gordon and Rosenblum (2004) studied auditory perception of opening width and height. In two experiments, blindfolded sighted participants judged if they could pass through openings using only sound cues. They found that larger openings were perceived as more passable and that participants were especially sensitive to openings close to their body dimensions. These findings show how echo-acoustic information and proprioceptive cues aid in spatial perception.

Kritly and colleagues (2021) showed that sighted individuals can differentiate wall textures using ambient sound variations. They tested flat, convex, open, concave, crenelated, and staircase walls at 81 cm and 500 cm distances. Distinguishing flat and circular textures was hardest (68% detection), followed by crenelated and parabolic walls (73% and 75%). The wall with an opening and the staircase were the most distinguishable (81% and 84%).

Ashmead and Wall (1999) studied sighted individuals' ability to perceive a wall using ambient sound variations. Participants listened to simulated tracks of a wall at distances from 25 cm to 200 cm. By manipulating acoustic features, they found

perception thresholds of 48 cm, 59 cm, and 34 cm in three experiments, with an average threshold of about 47 cm. This distance marks the point at which sighted individuals can detect a wall using only sound cues.

Delong and colleagues (2007) studied the ability to distinguish materials by their echoes. Sighted participants listened to echoes from steel, aluminum, brass, nylon, and glass spheres, identifying the test stimulus and the other material. Differences in pitch and timbre allowed participants to discriminate between materials. Recognition rates were 55% for aluminum, 66% for brass, 74% for nylon, and 39% for glass. Each material produced distinct sound effects, showing how material properties influence auditory perception.

These studies suggest that wall texture, openings, wall proximity, and material choices significantly influence the experience of the sense of volume at the architectural scale. The Orb Pavilion's design, with diverse spatial configurations, curved structures, and deliberate material selection, incorporates elements that resonate with this sense. Influenced by his empirical knowledge, André Bruyère used these variables to enhance user experience. Our exploration of the sense of volume in the Orb Pavilion aims to provide insights into how a multisensory aesthetic can promote well-being and care for users.

5. FEELING VOLUMES IN THE ORB PAVILION

To support our investigation, we documented the sensory and affective experience of *the first author* in the Orb Pavilion. She focused intensely on these sensations, exploring the building without prior knowledge of its layout or the architect's intentions. Using the method of a commented walk, she systematically covered the lobby and various spaces (common areas, bedrooms, corridors, alcoves) without the use of sight. This approach filtered out sensations from other perceptual modalities to isolate those linked specifically to the sense of volume. Her analysis identified four main types of experiences: spatial perceptions, encounters with thresholds, sensations of presence, and perceptions of materiality.

5.1. Spatialities

During her exploration, *the first author* vividly describes encountering various spatial configurations with each step, guided by sensations of volume. She observes the curves of walls and ceilings, perceiving their dynamic interplay of approaching and receding dimensions.

The curved walkways evoke a forest-like atmosphere, with irregular spatial presences akin to scattered trees. The curves subtly contract and expand around her, maintaining a continuous engagement with the building and occasionally causing a slight disorientation.

The alcoves spaced along the walkways captivate her interest, with gradually decreasing ceiling heights. Entering one, she finds herself drawn to a corner where a chair is conveniently placed by a window, feeling a sense of safety and isolation from external sounds.

In larger areas like the entrance hall, the sense of volume is less pronounced, and the feeling of enclosure diminishes.

5.2. Presences

The first author senses surfaces (walls, large furniture, ceiling) around her, feeling the walls when walking through corridors. She notes intense sensations, such as the rhythmic movement of her steps along the curves of walls and ceilings. Changes in ceiling height prompt instinctive reactions, causing her to slow down and reach forward to avoid touching closer surfaces. Bathrooms with low, curved ceilings create a heightened sense of proximity. Walls and low partitions guide her movement and mark transitions, like a half-height wall in the tea area that requires navigation around it. These elements engage her body and maintain alertness throughout her exploration.

5.3. Thresholds

In the pavilion, the sense of volume facilitates transitions and thresholds between different spatial areas. Some transitions are gradual, characterized by subtle shifts in dimensions and spatial form. Others are abrupt, marked by sharp contrasts between adjoining spaces.

Arriving at the alcoves positioned at the ends of walkways is a gradual experience. *The first author* notes her body gradually tensing as she adjusts to a new environment, a sensation closely linked to the decreasing ceiling height (see section 5.1).

Other transitions are more sudden, such as those between the expansive entrance hall and the walkways, bedrooms and bathrooms, and walkways and the restaurant. Doorways often create bottlenecks that accentuate these shifts. Throughout the exploration, these thresholds consistently denote a change in space usage.

As she navigates, *the first author* associates a 'trace' of each environment with her sense of volume, aiding in her recognition of traversed spaces and fostering a sense of agency.

5.4. Materialities

During her exploration of the Orb Pavilion, the first author highlights instances of simplified materials localized within the space. She finds the overall texture of her volume perception to be rather 'cold', particularly criticizing the use of plastic flooring and limited wall material variety. She suggests that incorporating wood or textiles could have provided a softer, warmer ambiance.

Interestingly, the 2014 renovation aimed for a streamlined material palette, opting for smooth surfaces like plasterboard instead of the original ochre brick cladding. This change resulted in a significant loss of color, texture, inertia, and resonance. The original dark, subtly soft nylon carpet in the bedrooms was replaced with a

glossy grey plastic covering. Distinctive porthole doors were replaced with plain ones lacking any detail or openings, and the entire space was repainted in white and grey, necessitating additional signage for visitor guidance.

6. MULTISENSORY DESIGN AS A TOOL FOR CARING ARCHITECTURE

In this article, we argue for the necessity of investigating multisensory design as a tool for creating caring architecture.

The work of André Bruyère, using architectural elements to imbue projects with empathetic qualities, has led to the conclusion that employing sensory diversity could be instrumental in meeting this challenge. Bruyère pondered the qualities he could integrate into his buildings and sought to incorporate affective affordances. Consequently, the Orb Pavilion offers a variety of sensory experiences that engage the entire body.

The focused study of volume perception in the Orb Pavilion reveals essential architectural characteristics: spatial arrangements, thresholds, boundaries, and materials. This sensory exploration embodies the architect's vision. Through *the first author*'s analysis of sensory and emotional engagement, we observe mechanical and emotional reactions to these stimuli. The spatial experience parallels Griffero's concept of lived space (2014), where embodied experiences unfold (Pillot et al., 2024). Curved pathways in the pavilion evoke sensations of contraction and expansion, akin to atmospheric qualities described by Schmitz (2019), also felt at thresholds and near surfaces. However, the perceived uniformity of material textures following the 2014 modifications lacks sensory richness in volume perception. Thus, volume perception engages the body in space and a sonic environment, unlocking the pavilion's affective potential and creating resonance in the present moment.

In order to evaluate whether these parameters could contribute to the practice of architecture as a form of care, we need to recall the concept's definition. The ethics and politics of care have gained increasing influence since Joan Tronto's 'Moral Boundaries' (1993). Her work highlights the inequities perpetuated by global capitalism, particularly affecting the outsiders in wealthier nations and the Global South. Tronto advocates for greater consideration and care for individuals, communities, and the environment, with a focus on future generations.

Tronto applied her framework to the architectural realm (2019), emphasizing the responsibility of all stakeholders within the construction industry for social and environmental justice. While her focus was primarily on the production of buildings, she did not extensively address the role of design. We propose that design practices significantly impact both the environment and the well-being of communities and individuals, regardless of their role as building users.

A sustainable building fosters connections with people, allowing them to live comfortably, accomplish tasks, and adapt over time due to its spatial design. Sustainability in architecture goes beyond durability; it includes spatial qualities that enhance user comfort, satisfaction, and a sense of belonging. Architecture

thrives on people's attachment and requires societal investment in its maintenance ans preservation, creating a reciprocal relationship where the building also cares for its caretakers and for their living and working conditions.

These emotional connections are influenced by various factors, with high-quality, attentive design, especially multisensory experiences, being pivotal. Architecture that understands human communities behavior, accommodates diverse atmospheres and spatial needs, and respects users' and caretakers' unique attributes can establish profound connections. The Orb Pavilion exemplifies this with its rich diversity of colors, scents, materials, shapes, intimacy, openings, temperatures, lighting, perspectives, and sounds, engaging a wide range of senses - each uniquely stimulated - while harmonizing as part of a cohesive architectural vocabulary.

If multisensory design contributes to the creation of a caring architecture, it is not the only dimension and cannot be sufficient on its own. The combination of multiple factors such as attentive programming, consideration of social, health, resources and climate impact, and care for non-humans plays a significant role in the development of a caring architecture.

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