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# SPATIAL QUALITY SHAPING WOMEN'S TRAUMATIC MEMORIES: A NEUROARCHITECTURAL PERSPECTIVE

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## ABSTRACT

In architectural studies, traumatic architecture positions space as a medium to evoke traumatic memories, where trauma is intentionally presented as spatial experience that built reflection, learning, and awareness, while transforming past events into architectural narratives. Humans often experience discomfort in spaces that are meant to be safe, particularly women, whose everyday experiences are shaped by gender-based vulnerabilities. Accordingly, this study aims to investigate the atmosphere and related architectural elements serve as foundation for developing formal and spatial concepts. It also explores how unpleasant events, such as discrimination and gender-based violence translated into design concept that function as a learning environment for raising awareness. A qualitative method explores human spatial experience, starting with literature reviews to synthesize architectural stimuli that trigger traumatic atmospheres through olfactory, auditory, and visual, including spatial odor, sound, spatial configuration, lighting, and colors. In-depth interviews conducted to understand events that represent women's traumatic memories. Sketches and AI visualization are then used to visualize and validate the perceived atmosphere. Findings show that traumatic atmosphere emerges from layered multisensory stimuli and spatial qualities experienced gradually by the body, positioning it as central yet vulnerable, pressured, and discomfort. Architectural elements such as ambiguous or limited spatial orientation, dim light, cold and dark colors, amplified sound, and disturbing odors could create traumatic atmosphere into space.

***Keywords: memory, neuroarchitecture, stimulus, traumatic architecture, women***

## INTRODUCTION

Humans constantly face challenges and problems that are not only related to their relationships with others but also intersect with their experiences in exploring the environment. Experiences within the built environment influence perceptions of safety and uneasiness, as the environments are often designed with an implicit understanding of their psychological and its impacts on individuals (St-Jean, Clark and Jemtrud, 2022; Navarrete-Hernandez and Afarin, 2023). The relationship between safety and the design of the built environment has often been a primary focus in environmental criminology research. Patterns of criminal activity are frequently influenced by how space is organized: poor visibility, isolated areas, inadequate lighting, or designs that fail to address vulnerable corners can all increase the likelihood of crime (Koskela and Pain, 2000). Areas with inadequate lighting, isolated open-space designs, building layouts that create blind spots, and a lack of social surveillance have been shown to increase vulnerability to such traumatic incidents. When viewed from the perspective of women, the built environment often fails to respond to the safety needs of vulnerable groups, particularly women who face the risk of gender-based threats, as well as the failure of public space design to provide a sense of security (Campbell, 2008).

Humans perceive and experience the built environment through their senses, where emotions, thoughts, perceptions, and memories emerge from electrochemical activities within the human body (Robinson and Pallasmaa, 2013). Perception is multisensory and facilitates individuals to construct spatial experience through direct interaction with their surroundings (Sari et al., 2022). Architecture, therefore, acts as a sensory medium that creates spatial atmosphere beyond visual involving olfactory, auditory, and tactile dimensions to shape perception (Gregorians et al., 2022). Within this process, sensory inputs are organized into cognitive schemata that structure how spatial experiences are interpreted and remembered (Lang and Moleski, 2016).

However, sensory stimuli experienced by human senses may be perceived as unpleasant. Under repeated, overwhelming, and uncontrollable exposure of the built environment can act as stressors that trigger trauma, which are then stored in individual traumatic experience, not only the event itself but also the psychological and cognitive responses arising from intense fear (Rubin, Neria and Neria, 2016; Kopec, 2024). Previous studies investigating the correlation between human senses and aversive memories have identified specific stimuli that can trigger such memories. Numerous studies have demonstrated that olfactory (the sense of smell) can evoke both positive and negative memories with more particularly vivid and specific. Olfactory memory is unique among sensory modalities due to its deeper encoding and strongly associated with intense emotions (Daniels and Vermetten, 2016). Memories triggered by olfactory stimuli often carry stronger emotional intensity, helping to explain the strong relationship between smell and memory (de Bruijn and Bender, 2018). Spesific source of smell are known to affect mood, increase happiness, or even reduce stress indicators (Herz, 2016). Odorants may affect physiological arousal associated with significant emotions, possibly through modulation of neurotransmitter activity in the human brain (Daniels and Vermetten, 2016).

In the context of unpleasant memories, stimuli commonly involved in those kinds of memories including olfactory, auditory, and visual. These three types of stimuli have the

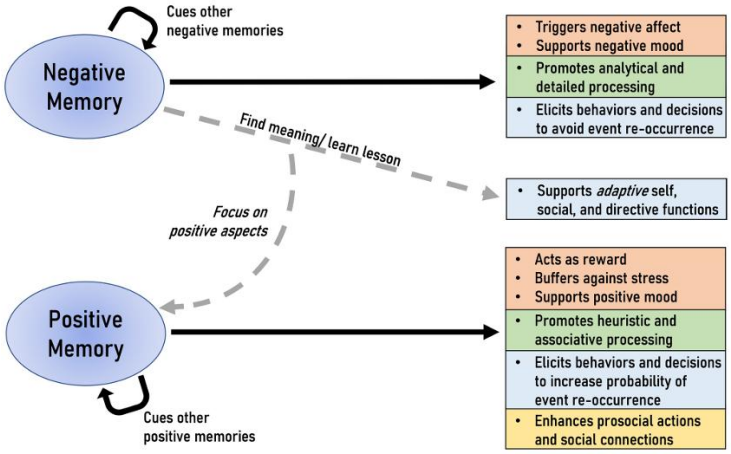


**Figure 1**. Negative and Positive Memories in Meaning-Making and Learning
(Source: Williams, Ford and Kensinger 2022)

potential to recall unpleasant memories with a heightened level of detail and vividness. This claim is supported by prior research that involving woman as their respondents, which found that olfactory able to evoke more emotional memories compared to other stimuli like auditory and visual (Toffolo, Smeets and van den Hout, 2012).

In response to these conditions, this study aims to investigate spatial atmosphere of women's traumatic memories to generate formal and spatial concepts through the application of traumatic architecture as learning environment. The research employs a qualitative method combining literature reviews to identify traumatic architectural stimuli such as olfactory, auditory, and visual as observational aspects that represent traumatic memories, followed by in-depth interviews to uncover embodied traumatic experiences. As illustrated in the conceptual diagram (see Figure 1), the coexistence of negative and positive memories shapes emotional states, cognitive processes, and behavioral tendencies. Memory is processed in the hippocampus that helps shaping human perception and spatial understanding (Ackerman, 1992). In this context, aversive memories may promote reflective thoughts, enabling individuals to interpret past experiences, derive meaning, and recognize their traumatic dimensions (Williams, Ford and Kensinger, 2022).

Neuroarchitecture provides a framework for understanding multisensory architectural experiences that influence perception, emotional responses, and the encoding of unpleasant memories through the interaction with the built environment (Satwiko, Felasari and Cininta, 2023). The built environment influences how individuals think, act, and regulate emotions, as architecture integrates perception with spatial elements such as light, form, and materiality (Zumthor, 2006; Eberhard, 2009; Ritchie, 2020). This relationship indicates that sensory engagement into space extends beyond perception into memory formation.

The concept of *Nachträglichkeit* proposed by Freud (2001) explains that trauma can emerge later through memory, highlighting its temporal and reconstructive nature. Trauma thus continues to shape how individuals interpret spatial experience over time, positioning memory as a mediator between past events and present perception. Given this, architecture can be understood as an active space medium that engages memory. Accordingly, traumatic architecture is conceptualized as an architectural approach that treats space as a medium

**Table 1.** Architectural Aspects Observed

| Stimulus Type | Mode of Attention | Stimuli Available | External Information Obtained | Architectural Aspects |
|---|---|---|---|---|
| Olfactory | Smell | Medium composition | The nature of volatile substances | Spatial odor |
| Auditory | Listening | Vibrations through the atmosphere | Nature and position of vibratory events | Sound sources |
| Visual | Looking | Source of radiant light and its organization in ambient light | Visual data in the optical array about entities, substances, fauna, movements, events, and places | Spatial configuration<br>Lighting<br>Color |

(Source: Lang and Moleski, 2016)

capable of storing and evoking traumatic experiences through its interaction with body, memory, and time (Stoppani, 2016).

Based on this understanding, traumatic architecture is interpreted as a spatial quality that can be presented and experienced through specific spatial settings. These spatial qualities are represented through the organization of multisensory stimuli like olfactory, auditory, and visual, it also includes several architectural elements such as table 1.

Table 1 serves as a framework for translating multisensory stimuli into perceptible and analyzable architectural aspects, thus facilitating an investigation into the impact of each stimulus in triggering traumatic memories through spatial experience. These aspects are operationalized into measurable criteria, including intensity and spatial distribution for olfactory stimuli; sound intensity and frequency for auditory stimuli; also scale, enclosure, lighting levels, and color properties for visual stimuli (St-Jean, Clark and Jemtrud, 2022). These parameters provide a structured basis for interpreting traumatic spatial atmosphere. These findings are then transformed into formal and spatial architectural concept of space for developing the concept of traumatic architecture, presented as a space to educate and raising awareness of women's experiences.

Women commonly to be more emotionally responsive when confronted with specific circumstances, and potentially more struggled forgetting traumatic experiences (Bosmans *et al.*, 2013). Hormonal changes can intensify emotional encoding, leading to more persistent traumatic memories (Cheung et al., 2013). In addition, longstanding assumptions that position women as fragile have contributed to discrimination and inequality in both public and domestic spaces. These conditions increase exposure to violence and reinforce the importance of prioritizing women's experiences, with this study focusing specifically on unpleasant or traumatic memories.

## METHODS

This study adopts a constructivism paradigm, known as social constructivism. This paradigm is often characterized as a worldview which influences how theorists construct theories and understand research realities (Spence, 2017). From a social constructivist

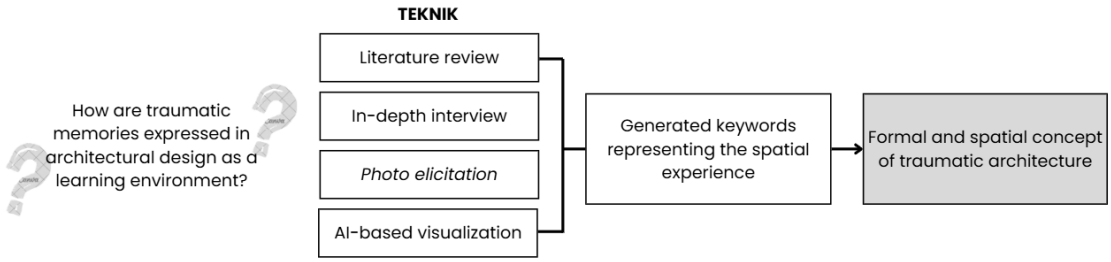


**Figure 2.** Data Analysis Techniques
(Source: Author, 2026)

perspective, individuals develop their insight through experience-based learning, social interaction, and influences shaped by historical and cultural contexts (Creswell and Creswell, 2018). Thus, constructivism considers the researcher and participants should work together to construct the essence of meaning through processes of interpretation. From an epistemological perspective, this approach is subjective, as knowledge is influenced by the researcher's experiences and interpretations, allowing subjects and objects to create reality together (Spence, 2017). Constructivism paradigm used in this study due to the experience explored is first person narratives to understand of how women experiencing and recalling the spatial qualities of their traumatic memories. The method used is inductive, indicating that the research question more open-ended and may adapt as the researcher's comprehension of the issue evolves throughout the research process (Groat and Wang, 2013).

Figure 2 is the methods and techniques used in this study to achieve the research objectives. A detailed literature analysis and in-depth interview used to collect data (Niezabitowska, 2018). Interview outcome generate a set of key terms, which then analyzed using coding techniques and validated through triangulation (Creswell and Creswell, 2018). The coding and triangulation are implemented to identify spatial qualities that represent the participants traumatic experience. These spatial qualities then transformed into design principles and applied into formal and spatial concept of traumatic architecture, which is conceptualized as an educational setting and a medium for enhancing awareness of women's traumatic experiences.

This study adopts a qualitative research approach, which emphasizes depth of understanding over the number of participants. Accordingly, purposive sampling is employed to intentionally select rich of information participants based on their relevance to research objectives (Palinkas *et al.*, 2015). Three women interviewed with various background and ages to ensure a diverse range of lived experiences is captured, allowing different dimensions of women's spatial and traumatic experiences to be meaningfully represented. The selection criteria include women who have experienced discomfort, fear, or distress in built environment, able to articulate their spatial and sensory experience, and willing to reflect on memories related to gender-based vulnerability. The study focused on discrimination against women's role in society, experiences of safety and comfort in public spaces, and the dual responsibilities of mothers and professionals. Ethical considerations are thoughtfully informed due to the sensitive topics of traumatic experiences. Participants provided confirmation about informed consent, along with confidentiality and anonymity

**Table 2**. Interview instrument

| Participant | Source | Stimulus Type | Observational Aspects |
|---|---|---|---|
| Participant N | Traumatic event | Olfactory | Spatial odor |
| Participant I | | Auditory | Sound |
| Participant C | | Visual | Space configuration, light, and color |

(Source: Author, 2026)

is maintained. They maintained the right to withdraw at any stage, and interviews are conducted with sensitivity to avoid distress or re-traumatization.

Olfactory, auditory, and visual stimuli considered as observational aspects as shown in Table 2, whose description inform the formal and spatial concepts of traumatic architecture for women, enhancing public awareness.

The interview examined women's public space experience, traumatic events, related spatial qualities, and notable architectural features. After the interviews, the researcher synthesized the observed aspects and reduced keywords that are less mentioned to identify dominant spatial cues. These reduced keywords are then used to produce prompts for Artificial Intelligence (Gemini AI). The visual output generated then confirmed with participants via instant messaging applications to verify the accuracy and relevance to their traumatic memory representation (see the procedure example on Figure 3).

## RESULT AND DISCUSSION

This study examines traumatic architectural elements including olfactory, auditory, and visual stimuli, such as spatial configuration, lighting, color, and sensory intensity. These aspects are based on personal experiences by interpreting participants traumatic memories through qualitative interviews, highlighting sensory and spatial patterns to guide the design of traumatic architecture as an experiential design approach.

### Participant Profiles and Traumatic Experience Context

The women who took part in this study came from diverse background, being in their developmental and productive life phases, also holding varied social roles, such as student, worker, and mother with multiple roles, to ensure that different experiences in both public and domestic contexts are represented.

Participant N (25 years old) is a woman of productive age who is now an employee. Her traumatic experience took place in a school environment when she was around 10 years old, specifically in a band rehearsal class. She repeatly exposed verbal degrading treatment by her male friend, articulated in a loud tone that remained clearly audible despite the surrounding noisy environment. This experience caused feelings of humilation and affects her self-confidence, persisting into adulthood.

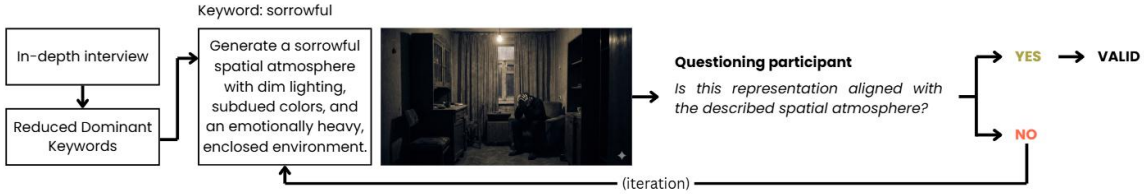


**Figure 3.** Example of an image generation prompt using Gemini AI
(Source: Author, 2026)

Participant I (25 years old) is a public university student, experiences presistent discomfort in form of catcalling while passing through construction areas, both in public roads and residential neighboorhoods. These incident occured despite her modest clothing and face mask during daily activities. Participant I defining trauma as enduring memory that make her discomfort, heightened alertness, and fear of re-encountering her harassers in similar context.

Participant C is a young working mother, 20 years old, with two children, who has experienced complex traumatic events as a woman during the postpartum period. Participant C has a background of long-term traumatic experiences rooted in a broken-home family condition since infancy, which continued into adulthood through relational dynamics with a stepparent, separation from caregiving figures, and demands for independence from an early age. These traumatic experiences reached their highest intensity during the postpartum period, when the participant was in a physically and psychologically vulnerable condition following surgical childbirth, while simultaneously facing a partner's infidelity, domestic violence, and the absence of a social support system.

**Stimuli Shaping Spatial Quality**

There are differences among the three participants when they are asked, "What dominant architectural elements are embedded in your traumatic memories?" In her sensory memory, Participant N recalled a distinctive spatial odor resembling that of a storage-like, poorly ventilated smell associated with sorrow, even though at the time the experience was not fully recognized as traumatic. In terms of auditory, the sound of crowded conversations talking about her, mixed with background noises of children's activities on the field, hightened feelings of discomfort and insecurity. Visually, the band practice room, which is geometrically cubic and similar in size to a standard classroom, perceived as narrow and oppressive due to the social experiences that occurred within it. Dim and isolated lighting, along with the use of dark and contrasting colors, such as dark blue carpeting, dark flooring, and a white ceiling, contributed to a gloomy, uncomfortable atmosphere that diminished motivation.

> *"What I remember most is the sound of people talking loud about me which effected my comfort… the dim light of the room, stuffy room, and the dark colors of the walls and floor as well felt uncomfortable and cramped."* — Participant N, 2026.

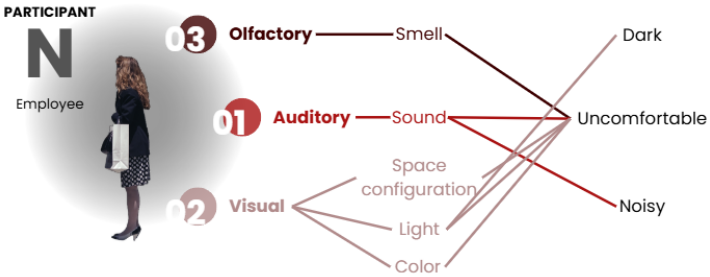


**Figure 4.** Event-based spatial quality of Participant N's traumatic memory (Source: Author, 2026)

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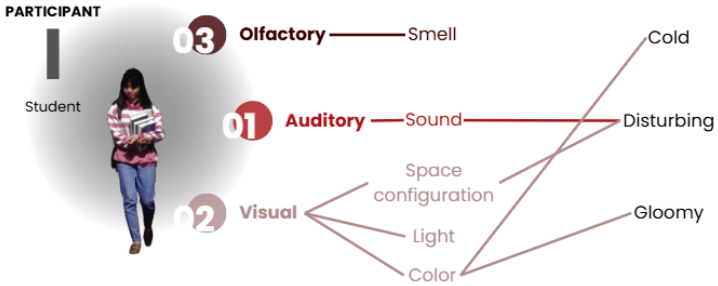



**Figure 5.** Event-based spatial quality of Participant I's traumatic memory
(Source: Author, 2026)

Based on the participant's reflection, auditory stimuli (human voices) and visual stimuli in the form of lighting and color emerged as the most dominant elements embedded in her traumatic memory, verbally represented through the keywords dark, uncomfortable, and noisy (see Figure 4).

In Participant I's sensory memory, olfactory stimulus is minimal, though associated with construction-related odor. In contrast, auditory stimuli are dominant, including verbal catcalling from construction workers mixed with repetitive construction sounds which loud and repetitive in nature. Visually, the setting is an unfinished outdoor construction site. Although the building scale perceived as human-scale, the open yet lifeless spatial condition triggered feelings of unease, particularly when the surrounding environment is quiet, causing the participant to instinctively accelerate her walking pace when passing through the area. The coldness of gray color of cement and blue tarpaulins covering unfinished structures became the most strongly embedded visual elements in her memory.

> *"The sound of catcalling voices were so disturbing…. and the visual impression of unfinished building colors feels cold and haunting."* — Participant I, 2026.

Based on the participant's responses, auditory stimuli from human voices and visual stimuli in the form of color and unfinished building conditions is identified as the most dominant elements in her traumatic memory, represented through spatial impressions described as cold (not in terms of temperature), disturbing, and gloomy (see Figure 5).

Participant C is a young mother with two children who bears all responsibilities on her own. As her traumatic experiences are closely tied to the postpartum period, spatially, these traumatic memories are strongly associated with the bedroom in her former home, which was perceived as narrow and oppressive despite having a physically standard size. The spatial configuration consisted of a rectangular room without partitions, with the bed

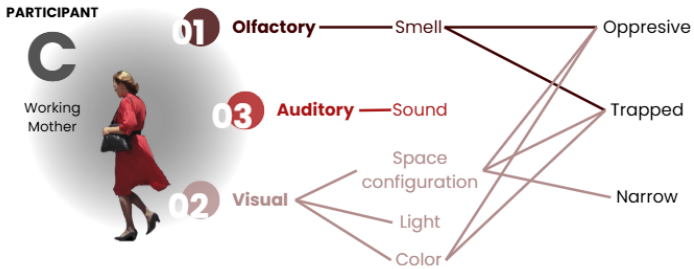



**Figure 6**. Event-based spatial quality of Participant C's traumatic memory
(Source: Author, 2026)

as the central activity area, a small window, and a black-colored door, generating sensations of confinement and a loss of refuge. Olfactory stimuli appeared as the dominant trigger, specifically the scents of *telon* oil, eucalyptus, also lavender-scented candles, which now trigger somatic anxiety responses such as dyspnea. These findings align with previous studies show that olfactory are deeply embedded with sensory stimuli that is linked to intense emotional response (Daniels and Vermetten, 2016; Herz, 2016; de Bruijn and Bender, 2018). Visually, flat lighting and the combination of a soft beige wall colors with black elements, along with white and warm yellow artificial lighting, elements that are typically considered calming, instead intensified emotional discomfort within this spatial context. In contrast, among the three stimuli mentioned above, auditory is relatively minimal and insignificant affect, limited to the sound of baby crying and caregiving-related calls.

> *"When I smell the presence of telon oil, eucalyptus oil, and lavender aromatherapy candles I feel overwhelmingly oppressive. Architectural elements, such as spatial arrangement that represent my domestic bedroom setting triggered me, while the calm color tones somehow make me feel oppressive, making it difficult to relax and causing a sense of discomfort."* — Participant C, 2026.

In summary, Participant C emphasizes that spatial configuration, color of space, and specific olfactory are the architectural elements most deeply rooted in her traumatic memory, illustrating spatial qualities described with three terms represent including oppressive, trapped, and narrow (see Figure 6).

Analysis of interview data collected from all three participants shows that the activation of traumatic memories within space is triggered by specific sensory stimuli that are dominant and meaningful for each of the participants, while other elements function as reinforcers of the experience. Participant N and I mentioned that auditory stimuli are the dominance stimuli significantly impacting their perception of safety, while Participant C's experience is primarily shaped by olfactory triggers, indicating that visual stimuli not always function as the primary triggers, but they consistently shape the quality of space in which trauma is experienced within space.

As presented in Table 3, the stimuli most vividly recalled from the memories of the three participants were visual stimuli (color, spatial configuration, and lighting), followed by auditory stimuli, and then olfactory stimuli. This finding aligns with previous studies indicating that combined forms of acoustic and visual memories in intrusive memory experiences are considerably more frequent among individuals with re-traumatization and

**Table 3.** Most Recalled Architectural Elements And Keywords Produced

| | Odor | Sound | Spatial Configuration | Light | Color | Keywords |
|---|---|---|---|---|---|---|
| Participant N | | | | | | Dark, **uncomfortable**, noisy |
| Participant I | | | | | | Cold, **disturbing**, gloomy |
| Participant C | | | | | | **Oppresive,trapped**,narrow |

(Source: Author, 2026)

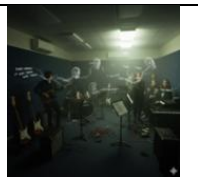
**Figure 7.** Memory Sketching Based on Narrative Participant N, I, and C
(Source: Author, 2026)

prolonged trauma compared to those who have experienced a single traumatic event (Müller *et al.*, 2016) Furthermore, the keywords generated by all three participants consistently represented spatial atmospheres with negative connotations, reinforcing the finding that traumatic architecture does not operate through a single element, but rather through a combination of key stimuli and supporting spatial qualities that together shape and activate traumatic experiences within space. The nine keywords produced by the three participants are subsequently reduced based on the frequency with which they appear in participants' spatial descriptions. The remaining keywords are uncomfortable, disturbing, oppressive, and trapped are then used as references for generating spatial atmospheres that embody the concept of traumatic architecture in the design.

## Visualizing Space through Women's Traumatic Experience

Through the synthesis of each participant's narratives, each traumatic experience displays diverse visual patterns and spatial atmospheres that represent their story of each traumatic experience. From that narrative spatial descriptions are then illustrated through hand sketching (see Figure 7), then visual generated by artificial intelligence (AI) namely Nano Banana by Gemini AI to validate the perceived traumatic atmosphere. The purpose of this step is to capture the essence of these atmospheres as perceived by participants, encompassing multisensory experiences including visual (spatial configuration, lighting, and color), auditory (sound), and olfactory (odor).

**Table 4.** Memory visualization of participant N, I, and C generate by AI

| Subject | AI Pompt | Visualization |
|---|---|---|
| Participant N | Visualize a spatial atmosphere set in a band classroom with gloomy lighting, where the surrounding elements are dominated by dark colors. The space is filled with people talking about a single individual, creating uncomfortable environment. |  |
| Participant I | Visualize a disturbing atmosphere of a woman being catcalled in an unfinished housing project, filled with loud, repetitive construction noise, creating a cold and tense sense of unease and vulnerability. |  |
| Participant C | Visualize an oppressive atmosphere set in a domestic bedroom during the postpartum period, where the space feels narrow and confining. The wall colors, though intended to be calming, instead make it difficult to relax, and the night time experience becomes deeply distressing. |  |

(Source: Gemini AI, 2026)

Table 4 is the memory visualization generated by Gemini AI from each participant's experience. Based on that, it is clear that traumatic experience occurred in diverse spatial contexts like domestic, public, and social spaces, yet a common thread can be recognized throughout their spatial narratives. These three visual representations based on hand sketching and visualization by AI emphasize the female body as the central, situated in a fragile, pressure, and uncomfortable position from sensory exposure. Spatial qualities such as dim light, oppressive proportions, disturbing auditory stimuli from the surrounding environment, dark and cold color contrast, and odors that interrupt spatial well-being are consistently present. Trauma is shaped and sustained through repetitive spatial experience, not just triggered by a single event. From this perspective, definition of space is seen as a dynamic medium that produces feeling of confinement and restricts women's bodily control, thus facilitating the activation of traumatic memories within space.

**Multisensory Spatial Concepts: Event-Based Trauma-Provoking Design**

The concept of traumatic architecture from combination of empirical research and spatial visualization understood as a spatial quality shaped by interaction of multisensory input, the body, memory, and time (Stoppani, 2016). Architectural aspects like sound, smell, spatial configuration, lighting, and color serve as spatial instruments that intentionally construct an atmosphere of controlled discomfort, thereby facilitating the gradual and repetitive reactivation of traumatic memories. Within this framework, the body is situated as the focal point of spatial experience, where the exposure to uncomfortable sensory stimuli becomes the primary medium for the formation of traumatic experiences. These stimuli include olfactory, auditory, and visual.

The remaining keywords are uncomfortable, disturbing, oppressive, and trapped serve as references for constructing a gradient traumatic atmosphere along four spatial phases shown in Figure 8. This increasing gradient reflects the understanding that both trauma and spatial experience are constructed as layers of sensory and emotional processes, where accumulated stimuli shape perception and memory over time (Van Der Kolk, Burbridge and Suzuki, 2001; Robinson and Pallasmaa, 2013). These four keywords describe the gradation of negative atmosphere in spatial experience: disturbing as the initial narrative, oppressive as intense and continuous pressure, trapped as the most extreme condition.

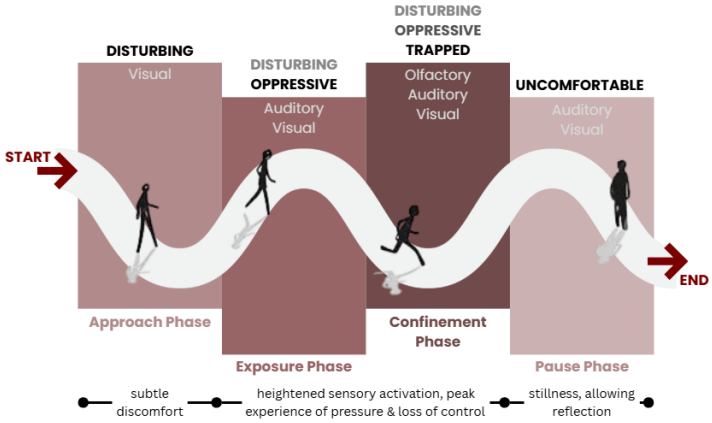



**Figure 8.** Transition of space concept
(Source: Author, 2026)

**Table 5.** Spatial Experience Phase Description

| Spatial Phase | Spatial Atmosphere | Produce | Spatial Impact |
|---|---|---|---|
| Approach Phase | Disturbing | Awareness through disruption | Subtle unease without direct pressure, initial bodily awareness of disturbance |
| Exposure Phase | Oppressive Disturbing | Pressure and exposure | Sustained psychological pressure through intensified sensory exposure |
| Confinement Phase | Trapped Oppressive Disturbing | Loss of control | Peak traumatic state marked by confinement, vulnerability, and loss of control |
| Pause Phase | Uncomfortable | Reflective discomfort | Reflective pause without full relief, allowing awareness of the experience |

(Source: Author, 2026)

indicating loss of bodily control, then decreasing uncomfortable stimuli at the end of the journey as reflection.

The conceptual diagram of the four phases, illustrated in Figure 9, serves as a guideline for developing the concept by demonstrating that traumatic architecture is constructed through the orchestration of spatial configurations, lighting, sound, smell, materials, and colors arranged in a processional sequence, not only from a single architectural element. These elements then work together so create disturbing–oppressive–trapped–uncomfortable spatial experience, with women's bodies placed at the center of experience, allowing trauma to emerge as a gradual, controlled, and reflective spatial experience.

The disturbing atmosphere of approach phase is produced by reducing perceptual clarity, as multisensory is shaped through the interaction between the body and the environment (Pallasmaa, 2014; Sari *et al.*, 2022). Limited visibility and unclear spatial definition associated with heightened perceptions of uneasiness and vulnerability (Koskela and Pain, 2000; St-Jean, Clark and Jemtrud, 2022). This theoretical foundation suggests that ambiguity and reduced perceptual clarity function as initial triggers of sensory disruption (Mallgrave, 2010). Architecturally, this achieved through orientation that is not entirely clear, uneven lighting and the use of cool neutral colours weaken visual clarity, creating early perceptual disturbance.

In the exposure phase, spatial pressure increases through repeated auditory and visual stimuli, as continuous sensory exposure can act as environmental stressors that trigger trauma responses (Rubin, Neria and Neria, 2016; Kopec, 2024), reflecting women's experiences in public spaces that often fail to provide a sense of comfort and safety. Auditory stimuli, particularly human-generated sound such as catcalling, overlapping people talking, vehicle noise plays significant role in shaping women's perceptions of safety in public spaces (Campbell, 2008). Space is designed to create the acoustic characteristics of space that either bounce off or lengthen auditory signals, both human sounds and environmental noise. Dim light and dark-coloured materials evoke a heavy and oppressive atmosphere, causing the body to be "overwhelmed" by its presence. In this phase, architecture acts as a restrictive design strategy that intentionally reduce comfort, narrows bodily tolerance, and heightens the sense of exposure.

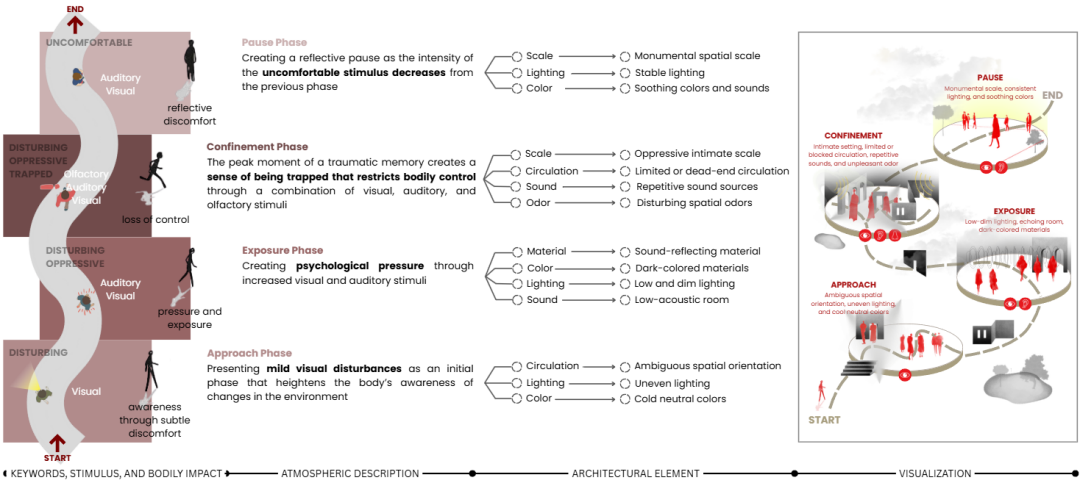



**Figure 7**. Conceptual diagram to produce design
(Source: Author, 2026)

The confinement phase is the peak of the traumatic architectural experience, where restricted movement, compressed spatial scale, and the simultaneous activation of olfactory, auditory, and visual stimuli intensify the atmospheric moment of vulnerability and loss of control. Olfactory stimuli play a key role in triggering intense emotional memories (Daniels and Vermetten, 2016; Herz, 2016; de Bruijn and Bender, 2018), while enclosure, limited escape routes, and lack of surveillance could improve vulnerability (Koskela and Pain, 2000). Accordingly, the architectural concept of this phase such as spatial scale and circulation both oppressive and limited, reducing freedom of the body movement. Disturbing spatial odours serve as immediate, body-centered memory triggers, while repetitive sound amplifies the sensation of being stuck. Architecturally, the space in this phase acts as an active agent that limits the visitor's bodies, thereby facilitating the repetition of traumatic experiences.

After going through difficult times, the body enters the pause phase, where tension is stabilized to enable reflection. In this phase, space is designed with more open scale, even light, cool colours and atmosphere, no extreme stimuli exposed, yet no architecture element that area completely calming. This creates a self-introspective area, allowing one to rest, acknowledge the prior experience, and process residual trauma. Pause phase affirms that trauma is not resolved by space but instead remains as a trace of experience.

These four phases visualized in Figure 10 shows that traumatic atmosphere is constructed through the gradual orchestration of multisensory exposure, such as olfactory, auditory, and visual that shaping experience through the interaction of the body, memory, and environment (Stoppani, 2016). From that perspective, traumatic architecture understood as temporal process rather than merely a formal expression.

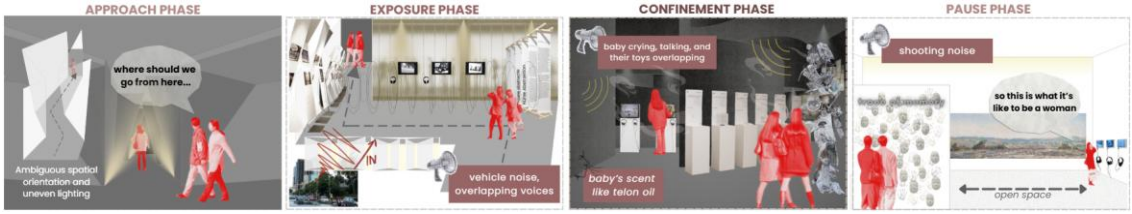



**Figure 10**. Conceptual Visualization Four Phases of Space
(Source: Author, 2026)

## CONCLUSION

This study reveals that the atmosphere of traumatic experience is built from combination of multisensory stimuli and spatial qualities experienced by the body gradually. It positions the body as central, often placed in fragility, pressure, and discomfort. Trauma is not a singular event, but is formed and sustained through repetitive spatial experience that expressed through its layered and sequential design. Traumatic spatial atmosphere is created by various architectural element to control bodily perception and movement like ambigous or limited spatial orientation, while uneven or dim lighting and cold, dark colors reduce visual clarity and comfort. Sound-reflecting materials amplify repetitive noise, and disturbing odors trigger traumatic memory. Through this combination of stimuli, space gradually increase discomfort, pressure, loss of control, shaping a continous and embodied traumatic experience. These findings are the outcomes of a research by design process, which will further developed into formal and spatial design strategies within the framework of traumatic architecture as learning environment. The novelty of this study lies in the translation of women's traumatic experience into operational spatial criteria through a traumatic architecture approach, which presents trauma in a contemplative and controlled manner while enriching architectural discource through the intergraion of neuroscience and design. Future research is recommended to validate these criteria through the development of targeted design proposal or full scale experimental designs, while also widening the scope to integrate a variety of cultural settings, user groups, and building types.

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