The Neuropsychology of Space: Designing Environments for Emotional Well-being

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Introduction

In the world of interior design, aesthetics often takes center stage. However, beyond a space's visual appeal lies a deeper layer of design that directly impacts our emotions and mental well-being. Understanding how our brains perceive space on a neuropsychological level allows designers to create environments that not only look good but also *feel* good. In this article, we delve into the profound connection between design and emotions, exploring how intentional design choices can shape our mental well-being on three levels: physical comfort, psychological safety, and emotional fulfillment.

Physical Comfort

Have you ever visited a space that looked amazing in photographs, yet turned out to be a disappointment in person? Perhaps there's a weird smell in the new office, or the hottest restaurant in town was so loud that you couldn't enjoy your meal, or the rug that looked gorgeous online turned out to be rough and scratchy underfoot. In all these situations, you couldn't feel at ease because even though the room was visually appealing, it was jarring to one or more of your other senses. That contradiction of sensory input which may occur subconsciously, can cause mental distress.

That is because while our first impression of spaces is often visual, our true experience of space uses all our senses, and much of that experience takes place without us even realizing it. Our emotions, thoughts, and behaviors are linked run on different neural pathways. They are interconnected and nd are not necessarily aligned, and they affect each other. That means our physical condition can affect our mental states, and vice versa, in obvious but also subtle ways.

It may be obvious, but it is very difficult to experience positive emotions inside a space that is physically uncomfortable. Just as the foundation of Maslow's Hierarchy of Needs is satisfying our most basic physiological needs (food, clothing, shelter, sleep), and Piaget's Stages of Cognitive Development begins with awareness of physical sensations, we cannot truly feel at ease if we are auditorily, visually, thermally or olfactorily uncomfortable.

That's why acoustics are so important! Spaces that are too echoey, too loud, or even too quiet can elicit anxiety, depression, irritability, and anger, in addition to impeding our abilities to think, communicate, learn, and even heal. That's because they create stress. Even when we're asleep, our hearing doesn't shut down and the effect of poor acoustics continues throughout the night, so people who sleep in noisy cities can wake up more anxious than those who live in quiet areas. Addressing reverberation and noise issues is pretty straightforward, by properly detailing off-wall construction and specifying the appropriate surface materials and acoustic products.

Glare and harsh light contrasts are another source of annoyance that not only impede our ability to see properly but also lead to distraction, stress, and annoyance. Installing proper window shading, using clerestory windows, specifying indirect lighting, and employing polished surfaces judiciously are all remedies. Meanwhile, specifying walls and floors so there's at the least a 30-point difference in LRVs (Light Reflectance Values) will eliminate confusion and anxiety for seniors, whose changing eyesight creates difficulties in discerning the perimeters of spaces. And circadian lighting systems, that adjust throughout the day to mimic the color and intensity of the natural cycle of daylight and nighttime,

Rooms that are too hot can also have an emotional impact. Short-term, they're irritating; long-term, they too can cause stress, anxiety, and cognitive impairment. Rooms that are too cold or drafty are also annoying, but studies show that they can exacerbate depression and severe mental distress among people who are already suffering from mental illness. Interestingly, when people have the autonomy to change the thermostat, use a fan, or open windows to suit their thermal preferences, they report being able to tolerate a greater range of temperatures, even when they don't actually make those changes!

Of all the senses, smells pack the most emotional punch. It's the only sense that is not filtered by consciousness, because olfactory input travels directly from our nose to the emotion and memory areas of our brain, rather being integrated and interpreted by other areas. That's why a smell can instantly remind us of places, people, and events, and cause a change in mood. Companies from hotels and offices to casinos and even big events are now taking advantage of our subconscious by purposely scenting areas to affect our mood.

Of course, our senses do not work individually; our impressions of a space are multi-sensory, and if all that sensory input is positively aligned, then our moods are also more positive.

Psychological Safety

Once our physical comforts are satisfied, the next level of emotional impact is related to psychological safety. Some interior design factors dealing with safety are obvious, such as balustrades and lockable doors, but there are many other design choices that trigger hardwired emotional responses that are rooted in evolutionary advantages.

Vision is the strongest and most obvious of our senses, as being able to spot danger from afar has been an evolutionary advantage rather than hearing it, smelling it, feeling it, or tasting it. There has been a lot of research on the effect of colors on various moods, and across many cultures, blue and green are generally more popular colors than red and murky dark colors, because open sky, clean water, and green grass are healthy and soothing, while red instantly grabs attention and increases are heart rate and darkness hides danger.

When it comes to spaces, one of the most powerful natural determinants of safety has to do with prospect refuge. When the first humans lived on the African savannas, they preferred spaces where they could simultaneously see long distances all around us ("prospects") and hide from predators ("refuge"). So the wide grassy plains and trees spaced short distances apart offer both prospect and refuge. So spaces that afford both the opportunity to hide away in relative privacy while gazing out into a larger space are psychologically soothing, whether they take the form of attic lofts, theater balconies, restaurant booths, or high-backed chairs.

Being able to see into adjacent rooms is also correlated with wayfinding. Rooms with wide doorways, high ceilings, and large windows are easier to navigate because they have large "isovists" – the three-dimensional volume of space you can see from a given location. Spaces that are highly legible, meaning they have logical adjacencies and sequences, are also more psychologically comforting, because we can more easily form mental maps to orient ourselves and plan our routes.

Even shapes can affect our moods. Curved forms have been shown to be more appealing than straight or jagged ones, perhaps because rounded objects don't have sharp edges or points, or because as babies, we search for our mothers whose faces and bodies tend to be curved. These shapes translate into spaces as well, as researchers have found that people are more likely and spend time in curved rooms than angular ones. So spaces with domes, curved walls, and ceilings tend to be very appealing, such as the Pantheon, the Stockholm Public Library, or the Shenzhen Airport. In contrast, buildings with jagged points and volumes that appear precariously balanced, while attention-getting, can cause us to release stress hormones and create anxiety.

Sound can be distressing, as discussed earlier, but it can also create feelings of calmness and contentment. There is currently a lot of interest in creating spaces that bathe people in "high resolution" sounds found in nature. Unlike typical recordings of, say, forest bird sounds, these soundscapes record quiet, almost unnoticeable sounds of the ocean, a crackling campfire, or a low heartbeat that are recorded with several microphones to create even more immersive spaces than simply Surround Sound. When used in operating rooms, these sounds have been shown to reduce patient stress and anxiety, even when they are under anesthesia, and they increase the mental acuity of the surgical staff.

Hospitality, workplace, and retail designers are now also experimenting with subtle, barely noticeable scents to lift people's moods and entice people to return. While some may feel this is manipulative, one can think of many situations where there are legitimate reasons to lift moods: how about a dentist's office waiting area, or an airport waiting area?

Emotional Fulfillment

Beyond providing physical comfort and psychological safety, interiors can elicit higher-level emotions such as fascination, wonder, transcendence, and inspiration by employing patterns, shapes, furniture, art, and elements of nature.

Fractals have received a lot of attention in recent years. Fractals are patterns that repeat as they get smaller and smaller. The repetition of patterns at varying levels is infinitely engaging because they invite you to look closer and closer. They are not too dense and not too sparse, and they are complex enough to be interesting, yet simple enough to be understood. Nature is full of fractals, from snowflakes and plants to the bare branches of winter trees. They are also found in the rose windows of Renaissance cathedral rose windows and the sand mandalas in Buddhist monasteries. When we gaze at fractals, all the areas of our brain that assess shape, color, and repetition light up at the same time. We feel simultaneously relaxed, attentive, and refreshed.

Other spaces can create that feeling of awe – the feeling of being a small part of something huge and mysterious. These places, such as St. Peter's Basilica, or the Great Pyramids, tend to be huge and constructed with mind-blowing craftsmanship. When we're in spaces that elicit awe and a feeling of wonder, our pupils enlarge, our heart rate increases, and our fingertips sweat. We also feel small and humble, and part of something bigger than ourselves, which is probably why one experiment showed that our political and ideological attitudes become less polarized after we experience spaces that inspire awe!

Delight is a feeling that may seem hard to describe or quantify. Designing for human delight and celebration of culture, spirit, and place is a feature in the Living Building Challenge, and it involves the use of public art and biophilic elements. This is why decoration is so important in design – paying attention to colors, textures, details, and workmanship that celebrates what it is to be human. Spaces that pay attention to delight as opposed to mere functionality show that we care about the emotional fulfillment of the inhabitants and not just the ease of operation for the owners of the space.

Biophilia

It is not a coincidence that so many of the design strategies that reduce stress and elicit relaxation and happiness are found in nature. If we look at Terrapin Green's 14 Patterns of Biophilic Design, we find some familiar elements: Complexity & Order (fractals, awe); Thermal & Airflow Variability (thermal and haptic physical comfort); Biomorphic Forms (curves, rounded shapes, fractals); Prospect, Refuge, and Mystery.

We instinctively know that being able to see nature makes us feel better, and there is plenty of scientific evidence that it does. For instance, surgical patients whose windows faced trees recovered quicker and with fewer complications than those who faced a brick wall. Students whose classrooms had windows with views of nature had higher test scores than students who didn't. Exposure to natural daylight and circadian lighting improves digestion. This makes sense since our brains evolved to survive and thrive in nature.

Understanding how our brains process spatial experiences on a neuropsychological level helps us realize what a profound impact interior design can have on our emotions and mental well-being. By harnessing this knowledge, we can create environments that not only look beautiful but also foster emotional resilience and mental wellness. As we continue to explore the intersection of design and psychology, it becomes even more apparent that interior design can truly improve lives, and that it goes far deeper than the latest decorative trends that are splashed on the headlines of magazines and that gain millions of likes on social media. It's more important than ever that the public understands the value professional interior designers bring to the built environment.

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