

Experiential Design Rethinking relations between people, objects and environments

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Experiential Design – Rethinking relations between people, objects and environments



EDITORS: Yelena McLane and Jill Pable

SERIES EDITOR: Graham Cairns

PRODUCTION EDITOR: Eric An

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INTRODUCTION

Volume 2: Wellbeing, Design and Society

In January 2020, Florida State University hosted the international AMPS conference Experiential Design – Rethinking relations between people, objects and environments. The keynote speakers were Chris Downey from Architecture for the Blind, and Angela Spangler from the International WELL Building Institute.

The conference reflected a confluence of ideas and methods derived from two discrete calls for proposals – the first we directed to designers, artists, and architects, and the second to health, wellbeing, education, and psychology professionals. Although there were many confluences between the concepts addressed by these esteemed scholars and practitioners, we have structured the conference proceedings to reflect the original proffers. This second volume emerged from the following:

The diversity of issues dealt with in the fields of psychology, health and education mean that these disciplines are, almost by definition, interdisciplinary. Environmental psychology is intrinsically linked to issues of the spaces we inhabit and the places we identify with, making it uniquely relevant to this conference. Similarly, the Public Health movement has its origins in issues directly connected to this conference: the living conditions of the 19th century urban poor.

The education sector has long been at the forefront of spatial design, with the effects of environment on learning being long studied. However, it is not only these specific spatial strands of the psychology, health and education fields that are interdisciplinary and relevant to this call: social psychology, mental health care, clinical psychology, educational psychology, geriatric medicine, nursing and occupational therapy are all examples of other relevant disciplines.

In all of these areas health, wellbeing, education and psychology professionals can, should, and do engage with the world of designed objects and environments: school buildings, residencies for the aged, commercial settings, orthopedic products, artworks, ergonomic furniture, rehabilitation products and planning law for accessibility to name but a few.

Each paper in this volume centers upon the premise of wellbeing and design. We have arranged them thematically based upon the objects or environments implicated in the wellbeing of users, vulnerable populations, and larger social groups and societies. The perspectives of psychologists, urban designers, and architectural, interior and product design scholars, and design and engineering educators combine to reveal the extent to which design can be a catalyst for change in peoples' views of environmental stewardship, history, social equity, and equality.

We thank all of the participants for their engaging contributions to the growing discourse on the manifestations and meanings of designed experiences and experiences of design.

Yelena McLane and Jill Pable Tallahassee, Florida

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PERFORMANCE ANALYSIS OF BIOMIMETIC FACADES

Author: MAHSAN MOHSENIN

Affiliation: FLORIDA A&M UNIVERSITY, USA

INTRODUCTION

Biomimicry is an emerging field in architecture, where natural solutions could be implemented in design through geometric or behavioral adaptations. Davies presented the idea of an electrochemical skin, designed based on biological functions and micro structures.¹ Sandak, et al. comprehensively review the application and best practices for bio-based materials in building skins. For instance, the similarity between warm-blooded organisms and maintaining constant conditions in buildings is investigated parallel to plant inspiring implementations such as self-movements, moisture storage or selective-reflection.²

Examples of the state of the art in building skin prototypes include breathing skins, and bi-metals. Breathing skins, consist of pneumatic muscles, are prototyped in Germany in 2016 by Tobias Becker.³ The concept of bio-inspired building skins includes behavioral, material and formal approaches. The breathing skin project is an example of applying a natural adaptation behavior, whereas the use of sensors is categorized as the material adaptation. Observing nature, the harmony in the geometry and materiality is insightful. For instance, there are certain material constraints that are in line with the structure of a leaf to have it prototyped. The complexity of organic systems makes them function in complete cycles. The applications of digital fabrication in developing and prototyping biomimetic geometries expand the possibilities of milling, casting, and concrete 3D printing. However, there is insufficient studies on thermal and visual characteristics of complex geometries.

The concept of Biotecture is nothing new, but needs to be addressed when writing about biomimicry and the user experience. Michael Reynolds proposes the idea of making buildings out of glass jars or tires, providing for a sustainable food, clean water, energy, and sewage system ⁴. The end-user experience of people living in biomimetic facades is also of interest, since human interaction with nature has long been valued as a connection to well-being. Natural forms started the basis of designing engineered and ergonomic products, corresponding to the surrounding environment. People by nature are interested in aesthetics, if natural geometris are replicated with relevant materials and thermal performances, the results could improve the user experience.

Thermal analysis of complex building skins provides insights into the use of thermal mass as a design strategy, by demonstrating that the complexity of a building skin have measurable impacts on the thermal performance.⁵ Cupkova and Azel used physical experiments and heat cameras for heat transfer measurements. The laws of thermodynamics suggest that with the increase in the surface area, the heat transfer will increase, while a recent study demonstrated that the heat transfer coefficient is changed for two-dimensional geometries.⁶ Heat transfer formula is calculated using Q=UA.delta T

(1), where U is the heat transfer coefficient of the component, A is the surface area, and delta T is the temperature difference between outside and inside temperatures. Biomimetic geometries could increase the surface area, which means an increase in the total heat transfer; however, it is interesting to investigate whether such geometries could contribute to decreasing the U value and as a result the total energy. U value is only related to the materials that an assembly is made out of, but complex geometries could affect the heat transfer based on reflections.

Facade Adaptation Analogy

Observing how organisms and vernacular architecture adjust to the environment provides applicable information about geometrical adaptations. For instance, the morphology of an igloo is shaped not only based on the availability of the material, but also the absorption and reflection of heat on concave and convex surfaces. In hot climates, the use of available materials such as knotted brick or woven palm leaves create a form of natural shade and ventilation respectively. In this study, morphological adaptations focus on the complexity of natural geometries and beyond forms. One of the most interesting parts of this adaptation is how different organisms develop changes in mechanisms, shapes and sizes, which is similar to the function of thermal mass in buildings. To study thermal mass in facades based on complex geometries, this study categorized the geometries. This research provides a workflow to measure the thermal and visual comfort outcomes of the biomimetic facades, by categorizing the geometries and evaluating through simulations.

RESEARCH METHODOLOGY

Thermal mass in architecture is considered a physics character in design, which could fluctuate based on the properties of the layers of the construction material. The adaptation of thermal mass to the environment opens up avenues to evaluate how geometries could affect thermal load results, based on changes in self-shading and surface angles. This research investigates the impact of complex facade geometries on thermal load results, through a variation of taxonomy and climate conditions.

The geometry of the cases are selected to compare an 8' by 8' surface with a. concave and convex b. vertical and horizontal curve, and c. tessellated surfaces on each side of a cube (Figure 1). This experiment uses an energy modeling workflow that simplified surface geometries to track the outcomes, while maintaining the surface area and volume the same. To keep the area and volume constant, cases 2,3 are scaled by 0.99 and 0.97 for cases 4-6. The idea of using vernacular materials combined with new technologies such as CNC milling and casting creates innovative possibilities for thermal mass designs.



Figure 1. Taxonomy of simplified geometries used in this study

A variation of adaptive surfaces for building skins are modeled and simulated using energy plus embedded in Honeybee tool (Figure 2).⁷ The geometries are modeled as surfaces for the energy plus input and the material are assumed constant in the study. Each case is evaluated for both cold (Boston, MA) and hot (Phoenix, AZ) weather data. The hourly heating/cooling load and total energy usage are simulated to compare the fluctuations of thermal load for each taxonomy of the geometries.



Figure 2. Honeybee algorithm used to measure thermal properties of the skins

To test the user experience of biomimetic facades, this study also asked students in the Digital Fabrication course at Florida A&M University to design and replicate a biomimetic facade, using a CNC router. Figure 3 illustrates the students' projects and insights about the experience of such geometries as a building skin.



Figure 3. Students' biomimetic facade projects as an experiential design

THERMAL RESULTS

The measured results suggest a decrease in thermal load for some of the tessellated taxonomies, whereas the changes in curved geometries are negligible. This outcome indicates that with the same area and volume, complex geometries could result in a slightly lower thermal load. Figure 4 summarizes the results based on the building skin and climate. The data show the annual heating and cooling load in kBTU measured in Boston, MA (cold) and Phoenix, AZ (hot). The color-coded graph is a sample for one of the cases, and the chart illustrates the numerical comparison for all cases. This finding is in line with Cupkova's research, arguing that the U-value or the heat transfer coefficient changes based on the geometry of the profile. Cupkova's research used an accurate measurement technique for heat transfer. This study observes the total energy and visual comfort based on the energy plus calculations. Changes in the results, while keeping the area the same, signifies that the heat transfer alters. Comparing the results across cold and hot climates demonstrates that different geometries function in a similar manner.



Figure 4. Comparison of annual heating and cooling loads (kBTU) for Phoenix, AZ and Boston, MA.

VISUAL COMFORT ANALYSIS

This research is also interested in evaluating how biomimetic geometries influence the visual comfort in a space to provide a holistic performance analysis. We started with simple curves and tessellations, and created a mesh with a glazing ratio of 50% to investigate the *Melanopic* lux values across different geometries. Melanopic Lux (ML) describes the amount of light absorbed by an observer's non-visual photoreceptors.⁸ The ratio of the light absorbed through the non-photoreceptors over the photopic ones provides designers with a comfort level, ranging from alerting to calming. In lighting analysis, the attention has been often towards the annual average values, illuminance, or glare. However, in this study we decided to focus on quantifying the use of visual comfort level in relation with the reflections that occur on biomimetic surfaces.

To quantify light measurements, this study simulated visual comfort. This experiment used ALFA simulation tool to measure the *Adaptive Lighting for Alertness*, which works based on the circadian lighting.⁷ The visual comfort provides an empirical framework of the circadian light in complex geometries. Circadian rhythm is the natural human body process that translates light into levels of alertness during the 24 hours of a day. For the light analysis, the materials are assumed constant to explore light in different cases facing south directions, under clear and overcast sky conditions in Boston, MA. The materials are set as double-glazing Tvis 20%, white painted walls specularity 0.4%, Dark floor tiles specularity 1.2%, and white painted ceiling specularity 0.4%. Figure 5 illustrates the results for each taxonomy of the geometric patterns in this study.



Figure 5. Visual comfort results for different glazing ratios of the biomimetic facades

The ALFA results indicate that the M/P ratio fluctuations are not considerable, while the notable change occurs in the tessellated cases. M/P is the ratio of Melanopic over Photopic lux, where M/P>0.9 means an alerting circadian light level. All cases are in the alerting range, which could be explained by the close proximity to the glazing. The cases have also been tested for an overcast sky, where the changes are negligible.

CONCLUSION

The use of biomimetic geometries could bridge the gap between vernacular aesthetics and state of the art construction technology. With the use of digital fabrication in architecture, new materials could be combined with organic geometries as a building skin system. This research is an experiential test to evaluate the impact of complex geometries on thermal load and visual comfort. The results showed that heat transfer could change based on the geometry and tessellated surfaces with the same total area result in lower heat transfer; however, the difference between the curved surfaces and flat ones are negligible. This could be explained by the self-shading of tessellated surfaces. This finding remained constant in hot and cold climates. The comparison of the visual comfort across the geometries suggest a slight increase in M/P ratio in the tessellated cases, while all average ratios fall in the alarming range.

The exploration of building skin design in the context of the Digital Fabrication course provides the opportunity to explore the subject beyond technical measures and challenge the students to consider the user experience of the building skin. This paper tried to touch on thermal, visual, and experiential aspects of a facade within the curriculum in architecture education.

The combination of thermal and visual comfort results represents characteristics of such geometries as the possibilities for prototyping well-performing building skins. Biomimicry is one of the avenues to consider buildings as high performance systems. There are many factors affecting the performance of a building, such as the size, orientation, the ratio of glazing, materials, insulation, geometry, HVAC, etc. The choice of materials plays a significant role in approaching biomimicry and carbon-neutral buildings, considering a complete cycle for materials to return back to nature. To conclude, this study aims to couple the idea of prototyping technologies with biomimicry in facades and materiality of building skins. Observing the efficiency of organic systems, this scholarship focused on assessing the performance of complex geometries as a future research trajectory to optimize building skin designs.

NOTES

¹ Michelle Davies. A wall for all seasons. *RIBA J* 88(2) (1981):55–57.

² Anna Sandak, Jajub Sandak, Marcin Brzezicki, and Andreja Kutnar. *Bio-based Building Skin* (Springer, 2019): 19-26.

³ Tobias, Becker. Breathing Skins: <u>https://www.breathingskins.com/</u>

⁴ Michael Reynolds. Earthship: <u>https://www.earthshipglobal.com/#</u>

⁵ Dana Cupkova, and Nicolas Azel. "Mass Regimes: Geometry Actuated Thermal Flows," *Proceedings of the ACADIA Conference* (2014): 237-246.

⁶ Dana Cupkova, and Patcharapit Promoppatum. "Modulating Thermal Mass Behavior Through Surface Figuration," *Proceedings of the ACADIA Conference* (2017): 202-211.

⁷ Mostapha Roudsari. Ladybug Tools: <u>https://www.ladybug.tools</u>

⁸ Solemma LLC. ALFA: <u>https://www.solemma.com/Alfa.html</u>

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PHOTOVOICE AND THE DESIGN OF SCHOOLS FOR ASTHMA EQUITY: RETHINKING ARCHITECTURE AND NURSING FROM THE PERSPECTIVE OF DISABILITY STUDIES

Authors: ROBIN EVANS-AGNEW, SUSHIL OSWAL

Affiliation: UNIVERSITY OF WASHINGTON TACOMA, USA

INTRODUCTION

In school settings, problems with air quality and other environmental conditions that exacerbate asthma have been broadly surveyed and emphasized as key impacts of school design. However the perspectives of children with asthma are absent in discourses on school design from all relevant fields of literature from architecture, to education, and public health. For students with chronic health conditions, the critical analysis of school spaces remains unexplored in terms of environmental justice, health equity, and critical disability studies. Even in cultural geography, where significant work has otherwise taken place relating to space, illness, and disability during the past three decades, dedicated research on children with special health needs and the school architecture is not available. The only exceptions are where architects have designed separate special schools for children with disabilities.

In this paper, we describe the intersections of socio-spatial issues and health equity for schoolchildren with asthma from the interdisciplinary perspectives of architecture, nursing, and disability access. Based on original research conducted with Black youth with asthma in an urban school system, this paper aims at exploring the additional complications created by the administrative policies of school districts and the architectural design of school spaces in advancing equity in consideration for the student of color managing asthma. Drawing on empirical data collected by students with asthma, our study employs a critical disability studies-centered framework to analyze how normative spatial designs at the intersections of race and disability can function as an additional structural inequity in the wellbeing and education of the child with asthma. We present an exemplar of "stairs" to substantiate this claim employing photovoice stories. Our analyses further identify some critical nursing practice challenges imbricated in the socio-spatial aspects of the management of a chronic health condition such as asthma by urban youth.

We argue for an inclusive practice in architecture and school nursing that moves beyond the spatial accommodation and care of a normalized body and attends to the concerns of equitable involvement and environmental justice for urban youth with chronic health conditions. There is a need for

understanding the complexities embedded in the intersection of body differences and ableist physical environments and the resulting problematic human-space interactions that beg for improvement in spatial accessibility. We identify the potential of participatory and iterative spatial design approaches for transforming our material and conceptual thinking in architecture, nursing, and education.

Critical geographers have analyzed how constructed spaces relate to embodied experiences of health and illness among women.^{1,2} Researchers interested in tracing the medical causes of obesity among school children have also studied the ecological connections between obesity and built school spaces.^{3,4} Designers and architects have also historically stressed "healthy spaces" although they have focused only on building spaces "conducive to learning" rather than the considering embodied experiences of students, particularly those with chronic disabling medical conditions (p. 5).⁵

Asthma is a chronic inflammatory condition of the airways, characterized by mucus production and spontaneous or environmentally induced airway tightening.⁶ Asthma cannot be cured, but can be controlled through daily medication, education of the patient, frequent health provider visits, and avoidance and mitigation of environmental threats.⁶ Asthma is the most prevalent chronic condition of childhood, occurring within one in seven US families.⁷ Asthma inequities are profound; low income and Black youth are systematically denied adequate resources for controlling asthma and bear the burden of three times as many emergency room visits as white or wealthy families.⁸ Asthma is considered a disability under the Americans with Disabilities Act (ADA) in which disability is defined as being a "physical or mental impairment that substantially limits one or more major life activities" (Sec 12102) and includes impairments that are episodic.⁹ However asthma has not typically been examined as a disability requiring accommodations (p. 87).¹⁰

School nurses have only recently begun to consider involving themselves in improving school design; mostly in terms of the health room. McKibben and colleagues^{11,12} recommended that school nurses get involved in school design with boards, superintendents, engineers. Others have advocated for accommodations in design for physically disabled students.¹³ Absent involvement in the design of buildings for children with asthma, school nurses have instead focused on environmental controls and mitigation of threats to indoor air quality such as removing carpets.¹⁴ These actions are regarded as an overall responsibility of the nurse in the case-management of children with special health care needs.¹⁵

National government agencies have similarly focused on mitigation of air quality concerns for improving environments for youth and addressing asthma inequities.¹⁶ These plans only address reducing threats to exposure to air pollutants and mold in "School siting, new construction, renovations, repairs, operations and maintenance" (p. 7). Other federal agencies confine their expectations of the nurses role to managing air quality only in the health office.¹⁷⁻¹⁹ School officials are encouraged to create a safe and healthy environment as one of six steps for addressing asthma within a coordinated school health program.¹⁸ Yet this strategy is confined to addressing air quality and exposure to pesticides. The National Asthma Education Prevention Program calls for increased school nursing presence in each building but again only addresses air quality as the prevailing environmental concern for children with asthma.¹⁷ None of these documents identifies asthma as the primary disabling condition.

There has been some interest recently in tackling immediate outdoor exposures from retrofitting diesel school buses²⁰ to preventing cars from idling in the pick-up zones, to improving filtration and monitoring for outdoor air quality events such as traffic related pollution.²¹ There is an absence in the literature for environmental concerns related to enabling factors for children with asthma such as

locating classrooms in close proximity to each other and limiting the use of stairs to move between classrooms.

The discipline of nursing has maintained a biomedical orientation to disability despite increasing activism and awareness of critical disability studies. The biomedical orientation trains nurses to view disability as disease, an individual problem, as dependency on health professionals, as adapting to environment, as an (individual) object of medical gaze, or representing a culturally homogeneous group. There is little mention in nursing literature of larger societal contexts concerning disability or quality of life choices from the client's perspective. Environments are viewed in terms of how they "enable" rather than "disable" this individual. Some efforts have been made to re-contextualize disability within societal and political perspectives but only from the perspective of nurses.²² Some nurses have considered perspectives of disability from people with physical disabilities²³ but not invisible disabilities. Thus "an opportunity is missed to critically evaluate models, procedures, and practices within nursing to challenge dis-abling practices towards individuals with dis-abilities and to give voice to people with disabilities" (p.114).²⁴

CASE EXAMPLE

Background. In this exemplar we employed photovoice through a critical theoretical lens to examine how the discourses of asthma management disparities were advanced, maintained, or minimized by African American adolescents in Seattle, Washington. The research took place in 2010 between January and May. Seattle is the largest school district in Washington State and at that time comprised of over 46,860 students, and in the study area between 42% and 25% identifying as Black.²⁵

Method. Photovoice is an action research method employing participant documentary photography, group reflection and consciousness raising on the issue of concern, participant selection and display of annotated photographs to the community, and action planning for social change.^{26,27} We recruited 21 adolescents (16-18yrs, 55% female) from four high schools in areas with the highest adolescent (<18) hospitalization rates for asthma between 413.1 and 419.9 per 100,000.²⁸ We conducted four photovoice groups for two groups of male and two groups of female African American adolescents (n=19). Focus group participants discussed their identity, their experience managing asthma, and their opinions on inequities. Focus groups were recorded and transcribed. Participants were given digital cameras and encouraged over the course of the sessions to take and discuss photos that expressed their opinions on why there were inequities between black and white youth in terms of hospitalizations and asthma morbidity. They selected and annotated two photographs to display at a community gallery event that coincided with a meeting to develop the statewide asthma plan.

Results. Youth participants (58% female) identified as African American and ranged between 15 and 18 years old (Median = 17yrs). Early on in the study we noticed that youth were taking a lot of photographs of stairs. These were images taken mostly inside school buildings. Youth discussed these photographs in our focus group meetings. Some saw these images as a metaphor for the challenge to overcome their asthma. Others described examples of how stairs in the schools acted as a barrier ("a hassle") for them in the academics "on a daily basis", and as a metaphor for their "living conditions" (Figure 1).



Figure 1. Stairs: "I took this picture when I came late at test day. The stairs are about my living conditions. It is important to walk up the stairs and work very hard against your asthma."

One youth described how they would have to climb four flights of stairs to get the class inside a five minute-passing period. This resulted in them being out of breath and unable to concentrate for the first ten minutes of the lesson. Another described how "breathing hard" on the stairs made them late, and the teacher demanded that they get a late slip, which necessitated returning down the flights of stairs to the main office and then returning. One participant recalled that one the stairs made them so late that they were "assigned to Saturday school." When discussing inequities in asthma youth youth agreed that stairs were a tangible example of the inequities in design between schools in the segregated south end of Seattle compared to the more affluent north end: "North end schools usually have, like, long hallways. We have, like, stairs" and "We have more stairs down here in the south end. More stairs, more floors." To check on this assertion the research team conducted a walking audit of stairs in all the Seattle high schools. We found that the mean number of steps in a south Seattle school (n=85.5) was 255% higher than steps in the north (n=33.5).

DISCUSSION

Our case study indicates that students with asthma encounter unexpected challenges in navigating spaces inside schools with stairs. The observed differences in design between south and north end schools in Seattle appear to exacerbate inequities for students navigating these spaces while managing their asthma. The experiences of Black youth with the largely invisible disability of asthma reveal inadequacies in the protocols in place for addressing disability in the design of schools. Indeed this exemplar identifies a critical gap in comprehension and policymaking for centering disability in school design.

Managing asthma is a daily task that involves making complex decisions, yet little has been written about the challenge of navigating stairs in school buildings. Stairs present a particular environmental barrier because of the need for a short burst of intense activity interspersed by long periods of sitting in class. The only prevention for asthma exacerbations experienced during activity is to pre-treat with a rescue inhaler about 5 minutes before the activity, with the best effects occurring 20 to 30 minutes later during the activity.²⁹ This is not feasible in the school setting because of the very short passing

periods between classes, and the side effects experienced by taking a rescue inhaler (accelerated pulse, jitteriness) would interfere anyway with the ability to focus on the lesson.

Anthropologists have pointed out that "by always foregrounding the spatial distribution of hierarchical power relations, we can better understand the process whereby a space achieves a distinctive *identity* as a place" (p. 8).³⁰ In this exemplar, the space involved stairways for the Black student with asthma. The power-relations within the design demand that their bodies fit into the mold of a normative body and the daily challenge of making it into the classroom in time. The differences among bodies are thus denied or minimized; disempowering the Black student challenged with managing their asthma within this space. The resulting daily challenge is of navigating steep steps simply to meet the hierarchical conditions laid down by a particular culture about being late for class.

As we described in the introduction, most researchers concerned with asthma in the schools have deliberated on managing asthma for physical education and avoidance of environmental triggers such as mold and moisture. However key features of the National Framework for School Nurse Practice suggest that the physical design of a school should be a concern.³¹ The framework centers on a "whole school, whole community, whole child approach" for nursing practice that includes "the need to coordinate policy, process, and practice to achieve improved student health and education outcomes" (p.1).³² Leadership is one principle of the framework that requires nurses to be systems level change agents with the expectation that nurses engage with interdisciplinary teams and it is plausible these activities could involve facility maintenance and design. Integral to these standards of practice is for school nurse practice to be "grounded … in the core functions of public health" (p. 49) of which physical environments are considered a social determinant of health inequity.³¹

However it is not clear that school nurses are prepared to consider the impacts of invisible disabilities such as asthma in terms of school design. In a 2017 NASN position statement on care for the child with chronic disease, nurses are expected to "inform" responsible parties in schools of the "impacts" of chronic conditions on a students "abilities to engage in their education" (p.1).³³ The position statement refers to the two principle laws concerning these provisions: The Individual with Disabilities Education Improvement Act (IDEA, 2004)³⁴ and section 504 of the Rehabilitation act (1973).³⁵ Yet nothing in this position statement suggests that nurses prepare for anything other than clinical practice and case management. These practices tend towards confining school nurse practice inside a medical and individual model of care, where the physical health of the student is the paramount responsibility. Considerations for actions regarding inequitable environments for such care are muted. Further the guidance for school nurse responsibilities for addressing section 504 or IDEA are founded on reactive principles of educating school staff on "reasonable accommodations" or "commensurate opportunity" (i.e comparable to education for non-disabled) and balancing whether the condition is life-threatening or not.³⁶ Ultimately, reliance on 504 or IDEA might be misguided because these laws were created with an orientation to the individual, and not the "social conditions of ableism" (p.360).³⁷

Social inequities in school design and planning processes between wealthy suburban and urban schools exist.³⁸ The length of time involved with planning and design can span successive administrations in schools and discourage more limited facilities improvements that might be responsive to meeting emergent needs of youth of color with disabilities. National recommendations call for not only greater involvement of the public in design but also training and support for school staff to engage with local stakeholders yet do not mention persons with disabilities as central to the design process.³⁸ The guidance for school nurses in environmental design is similarly lacking with respect to the long term engagement in design, planning, and construction. School nurses are only

encouraged to "recognize and address [environmental factors] ... and work to mitigate the potential adverse effects" (p.2).³⁹ Yet school nurses are still expected to "understand the political landscape" in relation to setting goals with the families and communities they serve.⁴⁰ We are left with mixed signals and little direct guidance for the involvement of both nurses and youth with disabilities in the school planning and design process.

IMPLICATIONS & RECOMMENDATIONS

Opportunities exist within the structure of nursing to re-think the inclusion of voices beyond their profession in advocating for more inclusive school design processes. The American Nurses Association code of ethics⁴¹ explicitly argues that the worth of persons is "not affected by disease, disability, functional status, or proximity to death" (p.12) and requires nurses to be "vigilant and take action to influence leaders...[and]...governmental agencies...in all related health affairs to address the social determinants of health" (p. 50). Other nurses have recognized the need to critique existing models of nursing to expose disability practices towards individuals with disabilities and to give voice to people with disability " (p.114).⁴²

The exemplar provided in this article serves not only to question existing involvement of nurses inside school design, but also provides a novel method for inclusion of those with different bodies, namely the schoolchild in design. Participatory documentary photography has a long tradition of activism for change. Youth led participatory action through this means provides a visceral and iterative way to include the voices of youth in a participatory design and planning process for school spaces.

Participatory design processes involve the sharing of power with the end-user (traditionally the factory worker^{43,44}) and give them a voice throughout as systems engineers and managers conceptualizing, planning, and implementing change. Participatory design has been practiced in health care, community development and urban planning.⁴⁵ Significant possibilities exist for the professions of architecture and nursing to come together and work with school space users, in this case the student with asthma as a chronic disabling condition, to re-conceptualize school design. A lack of involvement of primary users of school spaces in architectural planning and design is a major gap needing attention from architects, school administrators and policy makers. The embodied experiences of disabled students have to be centered in this matter. Their participation in building planning process, along with that of school nurses, could result in inclusive learning spaces that would transform spaces for a range of bodies.

Administrators, teachers, and policy makers should take stock of school policies about movement of students, their use of spaces, and the availability of spaces of respite. School building design and architecture have been solely conceptualized for normative bodies and have very little room for bodies that do not, and cannot, reside on the normal curve. With rigid school policies on top of these exclusionary buildings, students also carry the burden of normative policies and procedures that were instituted long before disabled students were even given a seat in the classroom.

The field of disability studies has much to offer school nursing education in expanding conceptualizations of health beyond the medical model towards a more holistic conceptualization of the nursing role. School nurses in particular would benefit not only from the re-orientation of perspectives this would bring but also from considerations of unequal power relations in the embodiment of disability.⁴⁶ School nurse advocacy might then become more active in addressing inequities in the embodiment of chronic disease in their student population. A further recommendation is that school nurse training design include the voices of students with disabilities.

This article emphasizes the urgency of interdisciplinary research between nurses and architects in relation to school design. Studies are needed where researchers can examine participatory design projects that foreground health equity. Evaluation of such participatory projects will yield important models for practice and a re-envisioning of the role of school design in advancing both the education and health of marginalized communities.

The need for meaningful involvement of disabled persons in this research demands an inclusive, interdisciplinary, and integrative turn in engaging with disabled students from the perspective of disability studies. Meaningful research is possible through participation of disabled students. Most medical research takes a colonial view of the human body and engagement with disability studies literature can move the discipline away from this status quo.

CONCLUSION

In this article we advanced a novel conceptualization of the role of nursing in school design. We observed that hardly any scholarship exists on disabled students, nursing, and learning spaces. Employing an exemplar of Black students managing asthma in an urban school setting with the physical challenge of stairs; we argued for a more inclusive design process engaging architects, nurses, and students with disabilities such as asthma in a participatory design process. We urge professionals from both sides to develop participatory models that would bring architects, nurses, and diverse youth with chronic health conditions together to transform school designs.

NOTES

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INHABITING THE PUBLIC INTERIOR. AN EXPLORATION INTO THE CRITICAL ROLE OF PERSONALISATION IN IMPARTING QUALITIES TO PUBLIC LIFE

Author: VALERIE MACE

Affiliation: UNIVERSITY OF THE ARTS LONDON, UK

INTRODUCTION

This paper examines the concept of personalisation in the context of the public interior. It draws on a research project on intimacy in the public interior exploring how individuals can develop positive emotional connections with the environment of the public interior. Experiences generate emotions and Damasio tells us that "emotions are inseparable from the idea of reward and punishment."¹ As such, this study posits that personalisation is a positive experience when it is perceived as a reward. The research documents real life experiences of personalisation in the public interior to uncover observable characteristics and explore the critical role of personalisation in imparting qualities to public life.

RESEARCH CONTEXT

Kuksa and Fisher situate personalisation as a principle emerging from "the relative agency of 'persons' in different scenarios."² The use of the term relative indicates that a person may have agency but may not be fully in control of the experience. Kuksa and Fisher's definition is useful, however the study of personalisation in the public interior requires a more specific description. Here, the research draws on Gifford to frame the experiential space of personalisation as a form of positive territoriality³ to characterise personalisation as the way visitors can shape their experience of the public interior around their needs and desires to define personal and group territories. 'Personal' relates to the subjective environmental experience while 'group' relates to situations where two or more people share the same event in proximity but nonetheless always experience it subjectively.⁴ The concept of group experience is important to this study because it is situated in the public life of the interior where personal territories do not exist independently from one another. Moreover, even an individual who is alone and is not actively interacting with anyone else is still intersubjectively immersed in the experience of the collective context of the public interior. Limiting the study of personalisation to personal and group would however still be too reductive. The concept of personalisation is a little more complex. Kuksa and Fisher distinguish between two types of personalisation, personalisation 'for' and personalisation 'by.' These types do not exist in a dualistic mode but are effectively two sides of the same coin. They bring together the quality of environmental experience afforded to individuals through the relative agency of the design and management of the

environment – personalisation for the individual – and the relative agency individuals can exert on their environment and on their own experience – personalisation by the individual. Personalisation in the public interior is thus characterised as the way design and management impact on individuals' ability to shape their experience of the interior around their needs and desires to define personal and group territories.

The research centres on the phenomenal character of experiences of personalisation, described by Dretske as "the qualities that determine what it is like to have an experience."⁵ Personalisation is a concept, not the objective property of a space or object. Dretske writes that "a representational theory of experience must distinguish, in representational terms, between an experience of an object's properties—in the case of vision, its movement, colour, orientation, shape, size, texture, and so on— and a judgment (belief, knowledge) that some object has those properties."⁶ Thus, the objective property of a chair may be red while the property of the experience of the chair for the individual may be its redness. Following Dretske's terminology, the red chair is known as the representational vehicle while its redness is known as the representational content.⁷ It is the meaningful redness, the representational content, that is most relevant to this study.

The research also draws on Merleau-Ponty's theory of embodiment to follow a non-dualistic conception of body and mind, placing the body as the primary means of perception. Merleau-Ponty writes that "all knowledge is established within the horizons opened up by perception"⁸, suggesting that we develop our knowledge of the world through our senses, that the process is always multisensory and usually about more than one object. Hara illustrates how individuals assign significance to their environment by referring to the way babies learn about the world through interrelated multisensory experiences. Although at first, they are not able to grasp the significance of sensations, these progressively acquire personal values when "experiences in hearing, touching, seeing, tasting, and smelling acquire meaning all together."⁹ Thus, this study emphasises that personalisation develops through meaningful multisensory experiences.

RESEARCH SITE SELECTION

Cities need well designed public buildings and spaces, which, according to a report by the UK Commission for Architecture and the Built Environment (CABE), can "lift your spirit"¹⁰. A significant body of research on urban public spaces already exists and shows that the quality of the public realm impacts on place experience, social cohesion and the quality of life in cities.¹¹ As part of the shared destinations that constitute our experience of the city, public interiors can also contribute social values and impart qualities to public life.¹² Yet, with a few notable exceptions such as Poot, Acker and DeVos or Pimlott , the public interior has received limited attention in academic research. Poot et al. indicate that qualitative research on public interiors is fragmented¹³, with few insights on how they can contribute to the quality of human experience. Therefore, selecting the public interior as the focus of a study on personalisation helps consolidate our understanding of how these spaces can impart qualities to public life.

The Royal Festival Hall (RFH) (Figure 1), a cultural venue in London, was selected as the research site for this study following comparative studies amongst public interiors, also in London for parity.



Figure 1: Built in 1951 by architects Robert Matthews, Leslie Martins, Peter Moro and Edwin Williams, the Royal Festival Hall is located on the South bank of the River Thames in London.

The RFH was selected as the most suitable site for this study for the following reasons:

- It is publicly funded.¹⁴
- It is freely accessible to all, all day, seven days a week.
- It incorporates a variety of spaces and activities with significantly different environmental experiences.

• The practice of architect Peter Moro who oversaw the design of its interior was defined by a sensitivity to human sensibilities.¹⁵

- The RFH is well known for its popularity with Londoners.¹⁶
- It has been dubbed 'a people's palace' considered to be non-elitist and generous.¹⁷

Hence, the RFH was identified as an exemplar amongst public interiors in London. However, it is important to emphasise that this is not a study about the RFH but that the public interior of the RFH was identified as the most suitable location for the research.

CASE STUDY RESEARCH DESIGN

Thomas presents the case study as a valid tool in qualitative research, allowing the researcher to work with a restricted sample to carry out an in depth inquiry on a case, and gain a rich and detailed understanding¹⁸. In this study, the method of inquiry is transactional because the researcher is directly involved in the research. Hyett, Kenny and Dickson-Swift advocate "[a]n interpretive or social constructivist approach to qualitative case study research [to support] a transactional method of inquiry, where the researcher has a personal interaction with the case."¹⁹ This study is also structured as a collective instrumental case study because even though the study only involves one case, the public interior of the RFH is subdivided into study areas called 'nested elements'.²⁰ This distinction helps break down the research site into specific and manageable parts while instrumental refers to the objective of the study in providing insights on experiences of personalisation in the public interior. The building has six levels in total and publicly accessible spaces include areas originally designated as foyers, galleries and promenades located underneath and around the auditorium on levels 1, 2, 3, 4

and 5. The areas selected for this research are on level 2, 3 and 5 (Figure 2). These nested elements were selected following three main criteria:

- Their consistency in availability to visitors.
- Their popularity with visitors.
- Each provides a significantly different experience.



Figure 2: The subdivision of the study site into nested elements allows for the collection of data from different experiential environments, thus providing richer data.

DISCUSSION OF INSIGHTS

It is beyond the scope of this paper to provide a detailed account of the entire body of research and findings. Instead, the discussion focuses on key findings from the analysis to illustrate observable characteristics of personalisation and determine how the design and management of the interior, personalisation for visitors, can contribute to experiences of personalisation by visitors. For instance, the study of the design of the public interior of the RFH indicates that porosity is a characteristics of 'personalisation for' and privateness and exploration as corresponding characteristics of 'personalisation by'. The study of managerial practices on the other hand suggests looseness as a characteristic of 'personalisation for' and appropriation and customisation as a characteristic of 'personalisation by'. In this paper, the discussion of insights focuses on porosity, privateness and exploration.

Personalisation for: porosity

Porosity occurs when an interior integrates porous edges in its design. The study draws on principles of urban design defined by Sennett to distinguish between two types of edges: borders and boundaries²¹. Borders are porous edges, maintaining an open flow between inside and out, while boundaries are solid barriers such as walls. In the public interior of the RFH, porous edges exist between inside and out but also within the interior. In nested element 2 for instance, open riser staircases and cantilevered platforms with glass balustrades create an abundance of porous edges. Figure 3 illustrates a popular vantage point in the RFH. It is relatively common to see visitors standing there, watching and listening to the spectacle of the interior.



Figure 3: Vantage point in nested element 2 showing how the design of the interior integrates porous edges and open sensory flows.

Although not all vantage points need to be looking down onto a space below, Alexander et al. explain that "[t]he instinct to climb up to some high place, from which you can look down and survey your world, seems to be a fundamental human instinct."22 Thus, porosity can facilitate open flows between the different parts of the interior and, in the context of this study, open flows are understood as open sensory flows because they are experienced through the senses. Visitors remain connected to the rest of the space through sight, sounds and smells. Sensory open flows are documented and analysed in this research using a sensory flow diagram (Figure 4), a tool developed by the author in a previous study²³ and adapted to this research as a way to illustrate embodied experiences of porosity, the perceived qualities in the environment experienced through sight, haptic sight, sounds and smells. Touch and kinaesthesia are not included because the study of open sensory flows is concerned with the senses of distance rather than proximity. Accordingly, the diagram includes haptic sight to reference the tactile and chromatic qualities of materials sensed through sight. For instance, whether a material is perceived as soft or hard, warm or cool or smooth or rough will impact on the kind of qualities individual assign to their environment. Le Breton (2017, p. 34) references this phenomenon as the haptic way of seeing. The terminology included in the diagram (Figure 2) - Stimulating-Calming, Inviting-Distancing, Lively-Quiet, Evocative-Indeterminate - expresses a way to describe how individuals perceive qualities in the environment. A range of qualities was identified in the first iteration of the data analysis and the findings were regrouped into categories to determine which qualities were most significant. They do not represent a good versus bad dualistic perspective but a scale of qualitative phenomena, recognising the notion that sensory phenomena are fluid and changeable states and that perceptions will vary across individuals and situations. Thus, the sensory flow diagram provides a starting point to explore how individuals can experience porosity in the environment across a variation of situations, facilitating comparative studies between different times and vantage points.



Figure 4: Documentation of embodied experiences of open sensory flows from the vantage point shown in Figure 3. The diagram illustrates three different situations, all on Sundays for parity. It shows variations across sight, sounds and smells while haptic sight remains constant.

Porosity creates opportunities for vantage points to articulate the interior because porosity creates opportunities for visitors to pause, observe the spectacle of activities around them and get a sense of the entire interior. Tuan²⁴ identifies pause as one of the conditions necessary "for a locality to become the centre of felt values" while Whyte talks about people wanting to be part of the life of the space to be connected to others²⁵. As such, vantage points, pause and spectacle are identified as spatial and social elements underpinning experiences of porosity in the public interior. Porosity enables visitors to feel part of and invited into the public life of the interior.

Personalisation by: privateness

Porosity can contribute to privateness, identified in this research as a characteristic of personalisation by visitors. The term privateness draws on terminology used by Alexander, Ishikawa and Silverstein²⁶. It is preferred to privacy because privacy may suggest a complete withdrawal from others, while privateness can still exist in the context of a collective environment. Privateness means that visitors may define semi-secluded territories that have special qualities to them personally. However, embodied experiences of privateness are not wholly subjective, they are also intersubjective. According to Abram, this means that even though experiences are subjective, we are nonetheless able to recognise the reality of other experiencing subjects²⁷. Porosity enriches intersubjectivity. As porous edges connect visitors to the wider context of the interior through open sensory flows, visitors' attention fluctuates from their immediate environment to phenomena around them through sensing. This is why the term privateness is more appropriate than privacy. The need to define semi-secluded territories is explained by Hildebrand who assert that people tend to prefer secure and protected settings²⁸. Observations and informal discussions with visitors showed that this is an important quality but also that visitors still prefer to maintain a connection with the public life of the interior. The example in Figure 5 illustrates the concept of privateness. It depicts a situation where a visitor is sitting between two columns, reading. He has identified an opportunity in the design of the interior and has moved a chair from another area to create a personal territory. The columns create protective solid boundaries while the space is otherwise open to visual, acoustic and olfactive flows. Although nested, this territory is in flux, it expands and contracts as the visitor's consciousness fluctuates between the immediate embodied experiences of sitting on a chair, reading, and the collective context of the life of the public interior. In a large city like London where loneliness has been recognised as a problem,²⁹ being able to feel part of something is important. Moreover, studies in psychology by Billington et al. show that there is a link between reading and mental wellness³⁰. The example in Figure 5 illustrates the notion that the design of the public interior can impart qualities to public life by creating opportunities for visitors to feel secure and protected while still being connected to the collective life of the interior. It highlights the potential role of the public interior in alleviating loneliness and contributing to psychological wellness.



Figure 5: Analysis of open sensory flows from a vantage point in the interior.

Personalisation by: exploration

Porosity also contributes to exploration, identified in this research as a characteristic of personalisation by visitors. In an interview with Louise Brodie, Peter Moro underlines the primacy of movement in the design of the interior of the RFH. He explains that "if there was ever a building you've got to walk through to get the flavour of it it's the Festival Hall, because with every step the perspective changes, and you see new vistas. [...] it's not a static thing either, as I say, it can't be photographed even, it should be filmed, in movement, with a moving camera, as you go up everything changes all the time, you see more of this and less of that and new vistas are revealed."³¹

The design of the interior integrates circulation devices called promenades (Figure 6). They create opportunities for free exploratory movement and for visitors to experience the interior from multiple sensory perspectives. Because of their porosity the three-dimensional elements can, as Grafe explains, "emphasise the effect of the vast expanse of space, apparently entirely designed for walking about and enjoying the changing perspectives, rather than reaching a specific destination."³² The interior is designed to encourage exploration and as such provides visitors with a degree of agency. Visitors can personalise their experience because they can choose to an extent how they move through the interior. Observations show that many meander, looking up and sideways as they walk, observing, with no obvious destination in mind, seemingly allowing their senses to guide them. The interior becomes "an environment through which to travel."³³



Figure 6: View of the promenades in the open plan interior of nested element 2 showing how it is designed to encourage movement.

The concept of exploration as a form of personalisation by visitors is significant for two reasons. Firstly, because exploration is a form of approach behaviour,³⁴ a way for people to become intimate with their environment as they move through it. Secondly, because people who explore walk slowly. Sennett explains that "[...] walking slowly produces a deeper lateral consciousness than moving fast. Lateral accounting is one of the criteria for distinguishing place - a site in which you dwell - from space - a site you move through."³⁵ Sennett places lateral consciousness as an outcome of peripheral vision, which gives us richer information about our environment than focused vision. Accordingly, the faster the motion, the flatter the environmental experience, while on the other hand, as visitors meander through the public interior of the RFH, a deep lateral consciousness generates sensory nourishment and a richer quality of environmental experience.

CONCLUSION

While existing studies of personalisation primarily focus on products and services, this study expands the concept of personalisation into experiential space to explore observable characteristics of personalisation in the public interior. Insights from the research highlight interrelations between design, management and visitor agencies, governed by a symbiotic relationship between the notions of personalisation for visitors and personalisation by visitors. In the context of this research, personalisation is thus characterised as the way the design and management of the public interior can nurture visitors' ability to define personal and group territories. This paper introduced two characteristics of 'personalisation for', porosity and looseness, and provided a detailed account of the concept of porosity, with privateness and exploration as corresponding characteristics of 'personalisation by'. In response to the question 'how can personalisation in the public interior impart qualities to public life?', the research uncovered a number of outcomes, highlighting how the public interior can colour public life by providing opportunities for visitors to personalise spatio-sensory experiences, fostering emotional connections between visitors and their environment. The research suggests that through personalisation visitors can develop more intimate connections with the public interior, for visitors to inhabit the public interior and for personalisation to contribute to emotional wellness. The public interior selected for this research provides an interesting range of environmental experiences and richness in data. Further research will help consolidate and expand the work presented here, and the intention is to structure the findings into an experiential framework towards the design and management of public interiors, to cultivate the integration of personalisation as a desirable characteristic of the visitor experience in the public interior. The framework will be open and adaptable to other contexts, thus ensuring the transferability of the research from the public interiors.

NOTES

¹ Antonio Damasio, (2000) *The feeling of what happens. Body, emotion and the making of consciousness.* London: Vintage, 55.

² Kuksa, Iryna, and Tom Fisher, eds. 2017. *Design for personalisation*. New York: Routledge, 1.

³ Gifford, Robert. 1997. Environmental Psychology. Principles and Practice. London: Allyn and Bacon, 118.

⁴ Benz, Peter, ed. 2015. *Experience Design. Concepts and Case Studies*. London: Bloomsbury, 17.

⁵ Dretske, Fred. 2003. "Experience as representation." *Philosophical Issues* 13 (Philosophy of Mind):67-82, 67.

6 Ibid, 70.

⁷ Ibid, 68.

⁸ Merleau-Ponty, Maurice. 2012. *Phenomenology of Perception*. London & New York: Routledge, 215.

⁹ Hara, Kenya. 2017. *Designing Design*. Zurich, Switzerland: Lars Müller Publishers, 101.

¹⁰ CABE. 2006. Better public buildings. Commission for Architecture and the Built Environment, 1.

¹¹ Nikitin, Cynthia. 2009. "Civic Buildings and their Public Spaces can Improve the Quality of Life in Cities." *Recreation & Parks BC Magazine*, 10-11.

¹² CABE. 2017. Better Civic Buildings and Spaces. Commission for Architecture & the Built Environment.

¹³ Poot, Tine, Marteen Van Acker, and Els DeVos. 2015. "The Public Interior: The meeting place for the urban and the interior." *IDEA Journal 2015*:44-55, 47.

¹⁴ Jones, Alasdair J.H. 2016. *On south bank: the production of public space. Rematerialising cultural geography.* London and New York: Routledge.

¹⁵ AJ. 1998. "Peter Moro: an appreciation." The Architect's Journal, accessed 28 December.

https://www.architectsjournal.co.uk/home/peter-moro-an-appreciation/781266.article

¹⁶ Forty, Adrian. 2001. "The Royal Festival Hall – a "Democratic" Space?" In *The Unknown City*, edited by I. Borden, J. Kerr, J.Rendell and A. Pivaro, 201-212. Cambridge, Massachusetts and London, England: MIT Press. ¹⁷ Grafe, Christoph. 2014. *People's Palaces: Architecture, Culture and Democracy in*

Post-war Western Europe. Amsterdam: Architectura and Natura.

¹⁸ Thomas, Gary. 2013. *How to do your research project. A guide for students in education and applied social sciences.* London: SAGE Publications, 150.

¹⁹ Hyett, Nerida, Amanda Kenny, and Virginia Dickson-Swift. 2014. "Methodology or method? A critical review of qualitative case study reports." *International Journal of Qualitative Studies in Health and Wellbeing* 9, 1-20.
²⁰ Thomas, Gary. 2013. *How to do your research project. A guide for students in education and applied social*

sciences. London: SAGE Publications, 153.

²¹ Sennett, Richard. 2019. Building and Dwelling. Ethics for the City. London: Penguin, 218-220.

²² Alexander, Christopher, Sara Ishikawa, and Murray Silverstein. 1977. *A Pattern Language. Towns. Buildings. Constructions.* New York: Oxford University Press, 316.

²³ Mace, Valerie. 2014. "Sensing the Urban Interior." [in]arch conference, Universitas Indonesia in Depok, Jakarta, Indonesia, 10-12 September 2014, 183-194.

²⁴ Tuan, Yi Fu. 1977. *Space and Place. The Perspective of Experience.* Minneapolis and London: University of Minnesota Press, 138.

²⁵ Whyte, William H. 1980. The Social Life of Small Urban Spaces. USA: Direct Cinema Limited.

²⁶ Alexander, Christopher, Sara Ishikawa, and Murray Silverstein. 1977. *A Pattern Language. Towns. Buildings. Constructions.* New York: Oxford University Press, 610.

²⁷ Abram, D. (1997) *The Spell of the Sensuous*. New York: Vintage books, 37.

²⁸ Hildebrand, Grant. 1999. *Origins of Architectural Pleasure*. Bekerley, Los Angeles, Iondon: University of California Press, 21.

²⁹ Smith, Lydia. 2018. "Why is living in a big city so isolating?". CityMetric, accessed 22 December. https://www.citymetric.com/horizons/why-living-big-city-so-isolating-lonely-isolation-loneliness-4210.

³⁰ Billington, Josie, Christopher Dowrick, Andrew Hamer, Jude Robinson, and Clare Williams. 2010. "An Investigation of the therapeutic benefits of reading in relation to depression and wellbeing." Liverpool Health Inequalities Research Institute, accessed 8 December.

³¹ Brodie, Louise. 1996. Moro, Peter. National Life Story Collection: Architect's lives. edited by Peter Moro, 73.

³² Grafe, Christoph. 2014. *People's Palaces: Architecture, Culture and Democracy in Post-war Western Europe*. Amsterdam: Architectura and Natura, 135.

³³ Rice, Charles. 2009. "So the *flâneur* goes for a walk in his room.' Interior, Arcade, Cinema, Metropolis." In *Intimate Metropolis. Urban Subjects in the Modern City.*, edited by Vittoria di Palma, Diana Periton and Marina Lathouri, 72-89. London and New York: Routledge, 73.

³⁴ Mehrabian, Albert. 1976. *Public Spaces and Private Spaces. The Psychology of Work, Play, and Living Environments.* New York: Basic Books Inc., 5.

³¹ Sennett, Richard. 2019. Building and Dwelling. Ethics for the City. London: Penguin,185.

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FRACTAL WELLBEING IN INTERIOR DESIGN

Author: NOOR DANIELLE MURTEZA

Affiliation: THE OHIO STATE UNIVERSITY, USA

INTRODUCTION

Interior designers are responsible for creating the environments that prompt experience and shape mood, engagement and preference. People spend the majority of their time indoors, within the built spaces created by designers. Prioritizing wellbeing in interior spaces has been the aim of interior designers who understand the profound effect of the built environment on our psychological, physiological, and emotional wellbeing.¹

Interior spaces often suffer from banality created by blank forms and rigid lines. Spaces address American Disabilities Act (ADA) regulations in terms of dimensions and ergonomics, but do not always address visual interest, visual preference, and mood as conditions of wellbeing. Opposing 'careless' design—entrenched in ideological debates and novelty - is paramount for wellbeing, since it often neglects the human condition². And nowhere is the consideration of conditions at the human scale more important than within interior space, the scale at which humans spend the majority of their lives.

In recent years, the theory of biophilia has been presented as a solution for what the WHO called the epidemic of the 21st century—stress. A deeper awareness of the practical application of biophilic design practices among interior designers can lead to more interesting and stimulating spaces that enrich our wellbeing.³

BIOPHILIA

Human affinity for nature, termed biophilia, has captivated designers interested in designing for wellbeing. The aim of these designers is to leverage the restorative effects of nature into interior spaces to benefit the wellbeing of inhabitants.⁴ The favorable impact can be categorized into psychological effect, physiological effect, and aesthetic effect. The psychological effect can be understood as an increase in "... emotional restoration, with lower instances of tension, anxiety, anger, fatigue, confusion and total mood disturbance...."⁵ Positive physiological effects that occur when in the presence of nature include "...relaxation of muscles, as well as lowering of diastolic blood pressure and stress hormone levels in the bloodstream."⁶ The aesthetic effect of nature has been linked to an evolutionary system of processing natural elements. This system is titled Natural Information System (NIS). A positive aesthetic experience creates a positive emotional response that motivates us to inhabit a natural scene that is deemed hospitable.⁷

A theoretical framework set forth by Browning et al. provokes discussion as to how to apply biophilic design practically. The framework outlines the 14 'biophilic conditions', divided into three categories of natural analogs, nature in space, and nature of space, which could be utilized to reach the wellbeing effects of biophilia. These conditions are named 'Patterns', following from Alexander's "A Pattern Language" precedent.⁸ The 14 Patterns can positively affect the cognitive, physiological and psychological state of the users of a space. The framework is proposed as a guide to an architect, urban planner, or interior designer to highlight design opportunities that welcome a biophilic solution. The reductionist view of biophilic design, limited to introducing vegetation through an indoor courtyard or a windowsill planter, is combated in the outlining of the 14 Patterns and in particular through the adoption of Pattern 10 from Browning et al. (2014)'s biophilia framework. James Kunstler bemoans what he calls "the nature Band-Aid" approach, which seeks to place a ficus in the corner of a badly designed office space in order to improve the working environment and increase the wellbeing of those employed in the space.⁹ This trivial change is not sufficient when reordering of the space with a true biophilic approach is needed for a real improvement.

Pattern 10: Complexity and Order, under the category of Natural Analogs, speaks directly to the use of fractal patterns in design to create a balance between boredom and interest. A clear benefit is seen in expounding on Pattern 10, since it offers real-world applications that move beyond the simple introduction of living plants or pools of water. The limited understanding of the comprehensive prospects of biophilic design has been an issue that many designers have contended with.

Despite recent academic and senior practitioner research on biophilic design, there is a media, public and built environment practitioner misapprehension that biophilic design is solely about introducing vegetation... 10

The pattern of Complexity and Order calls on nature's organizational structure, in its symmetry, repetition, and pattern. This condition is described as follows "Rich sensory information that adheres to a spatial hierarchy similar to those encountered in nature."¹¹ The mathematical underpinnings of such natural order can be found in the math of fractals.

FRACTALS

Fractals were first categorized by Benoit Mandelbrot in his 1982 book "The Fractal Geometry of Nature." To judge any geometric pattern as a fractal, it must demonstrate certain characteristics. The pattern must repeat, and its repetition must happen at different scales. Elements of the pattern must also be self-similar. It must also be infinite in its repetition.¹² The characteristics of fractals have been set out by the famed mathematician Kenneth Falconer¹³ are:

- 1. Fine structure, a cascade of detail
- 2. Irregular, hard to describe with Euclidian geometry
- 3. Self-similar, mathematical (or exact) and statistical (or natural)
- 4. It can be described in a very simple way, recursion, translation, etc.

The interest in this investigation is focused on natural (or statistical) fractals, which manifest ubiquitously in nature around us on many scales, see Fig 1, 2, and 3.



Figure 1. Romanesco broccoli, an example of a statistical natural fractal (AVM, Wiki Commons) https://en.wikipedia.org/wiki/Cauliflower#/media/File:Cauliflower_Fractal_AVM.JPG



Figure 2. Statistical natural fractal patterning seen in cerebellum of the human brain (Carter, Wiki Commons)



Figure 3. The branching of tree trunks, an example of statistical natural fractal patterning (John Samuel, Wiki Commons) https://upload.wikimedia.org/wikipedia/commons/d/db/Tree_branches_with_some_lea

Wellbeing and Fractals

Joye comments on the abundance of statistical fractal patterns in nature and their relationship to wellbeing in the following:

While the fractality of nature has been amply demonstrated, there is no reason to believe that the presence of fractal geometry (in a sense) underlies these biophilic responses. To put it very crudely, it is not the tree that causes these emotional responses, but the fractal mathematics of the tree.¹⁴

Biophilic design strategies, including the application of fractal patterns, promise a wellbeing effect on the inhabitants of space.¹⁵ More specifically, studies show a strong relationship between statistical (natural) fractals and wellbeing. The self-reported perceived wellbeing effects of fractal patterns have been documented as an increase in visual interest, visual preference, and mood.¹⁶ Other studies in laboratory settings have proven wellbeing effects in physiological effects of reduced heart rate and diastolic blood pressure, as well as a decrease in alpha brains of the brain.¹⁷

These wellbeing effects of ordered patterns have not eluded designers both in the past and present. In fact, fractal patterns have been the topic of study for designers interested in practice and theory.

DESIGNER FRACTAL PATTERNS

Architecture theorist and Mathematician, Nikos Salingaros, highlights important stylistic trends that have affected visual complexity in design. The examples given of fractal design are often overwhelmingly traditional and historic. He traces the contemporary dearth of visual complexity to the living legacy of Modernism and the influential thoughts of Adolf Loos and Le Corbusier. On this issue he comments:

Thus they [Adolf Loos and Le Corbusier] condemned the material culture of mankind from all around the globe, accumulated over millennia. While these condemnations may seem actions of merely stylistic interest, in fact, they had indirect but serious consequences.¹⁸

Here he continues to speak of the consequences of removing complex, ordered patterns at the perceptible scale, the architectural (middle) and the interior/decorative (micro) scale:

The elimination of ornament removes all ordered structural differentiations from the range of scales 5mm to 2m or thereabouts... Looking around at twentieth-century buildings, one is hard-pressed to discover visual patterns. Indeed, their [modernist] architects go to great lengths to disguise patterns on human scales...¹⁹

The idea of a perceptible scale is one that reemerges with other researchers. In order to leverage the possible benefits of biophilic fractal patterns to our wellbeing, the scale of fractal implementations must correspond to the human experience.²⁰ The urban scale and architectural scale are not easily perceived by the inhabitants. When immersed in a built environment, interior space is the most readily perceivable scale. The smallest scale of fractal manifestation – surface decoration and ornamentation – would be the most impactful, since it is readily perceivable and most immersive. Christopher Alexander, in his magnum opus, "A Pattern Language", takes on the issue of ornamentation when

discussing this micro-scale. Alexander champions ornamentation, or visual complexity, as "extra binding energy" ²¹ that helps in connecting the elements of a building into a coherent whole.

Joye speaks to the importance of scale, adding that the intentionality of the designer in incorporating fractal patterns is critical.²² Introducing Joye's ideas to the characteristics set out by Kenneth Falconer ²³, The author of this paper proposes an amended set of characteristics that describe fractals in design, Designer Fractal Patterns (DFP):²⁴

- 1. Fine structure, a cascade of detail
- 2. Irregular, hard to describe with Euclidian geometry
- 3. Self-similar, exact or statistical (mathematical or natural)
- 4. It can be described in a very simple way, recursion, translation, etc.
- 5. Intentionally applied
- 6. Scaled iteration
- 7. 3 time nested iteration of shapes

Fractals in Design

These findings, concerning fractals and wellbeing, have practical implications for design. In fact, realworld manifestations of fractal patterns are seen in the architectural scale (middle), and the decorative interior scale (micro), and even in the urban scale (macro)²⁵ both recently and historically. Historic examples span geography, culture, and scale (see Fig 4, 5, and 6). Manifestation at the urban scale in the design of the African Ba-Ila villages (See Fig 4).²⁶

Fractal repetition and scaling is common in Hindu temple design and is a clear example of fractals in architecture (see Fig 5).²⁷ At the microscale, fractal qualities can be seen in Islamic patterns, both 3D *muqarnas*, and 2D tiling (see Fig 6).²⁸



Figure 4. The above images show the fractal structure of the Ba-IIa villages (Eglash,nd) <u>https://homepages.rpi.edu/~eglash/eglash.dir/afractal/afarch.htm</u>



Figure 5. The fractal quality of self-similarity is clear in the forms of Indian temples. (after lasef Md Rian) Joye, "A Review of the Presence



Figure 6. (Left) Safavid era patterning on the interior of a dome, showing self-similar, fractal qualities Derek Kaplan, "Safavid Surfaces and Parametricism," Archinect, 2011, https://archinect.com/features/article/29553480/safavid-surfaces-and-parametricism..

(Right) The muqaranas of the Aleppo Citadel, Syria. Its structure with self-similar, nested fractal qualities.

https://en.wikipedia.org/wiki/Muqarnas#/media/File:Aleppo Citadel, Syria (5077841786).jpg (wiki Commons)

If we look to historically recent designs, we see a resurgence of ornamentation. Charles Jencks attributes this resurgence to postmodern thought that brought with it a rejection of the dogmas and rigidity that typified Modernism and the International style.²⁹

The following are a few examples referenced by Charles Jencks of postmodern buildings that embrace ornamentation. The Façade of the Alexandria Library is covered with inscribed masonry lettering

using local stone cutting techniques (See Fig 7). This is a clear use of ornament signaling the cultural position and geographic reality of the Egyptian library.³⁰

FOA's Ravensbourne College of Design Communication's façade is an intricate pattern of Penrose tiling (See Fig.8). The brown and white tiles spread across the entirety of the building's face and are punctuated by round window openings.³¹ The tiling was designed to "express the culture of contemporary production, by using a non-periodic tiling system which symbolizes a more diverse and contemporary approach to technology."³²

A final example is seen in Toyo Ito's Tod's upscale store in Tokyo (See Fig.9). Again, an interesting envelope that serves a strong functional reason, with the lower panes of glass perfect for merchandise display and the upper smaller panes for personalized office space. The concrete bands grow upwards and get thinner as they climb, a clear call to nature and a visual parallel to a tree.³³ In this example, the fractal character is hard to deny. These buildings serve as examples to the contemporary acceptance of ornamentation in our style

It can be said that some of the architects and designers in these situations are reacting to the strict modernist style, which could be ascribed as the motive behind Toyo Ito's design. Others are looking to their communities and drawing from their traditional culture in a time where the prevalent style allows for such sources of inspiration, such as in Alexandria. For some designers, ornamentals and fractals unlock advanced technological tools that warrant exciting new processes, such as in FOA's building.



Figure 7. Snøhetta and Hamza architects' The New Alexandria library (1989 - 2001). Image from <u>https://snohetta.com/project/5-bibliotheca-alexandrina</u>



Figure 8. FOA's Ravensbourne Building façade (2010) is an intricate nonperiodic tiling. Image from <u>https://www.dezeen.com/2010/09/13/ravensbourne-college-</u> <u>by-foreign-office-architects/</u>



Figure 9. Toyo Ito's Tod's store in Tokyo, Japan (2002-2005). Image from <u>http://www.toyo-ito.co.jp/WWW/Project_Descript/2000-/2000-</u> <u>p_13/2000-p_13_en.html</u>

However, there is no clear indication that these architects are aware of the wellbeing effects of this type of perceptible visual complexity. And it is probable that few are focused on the micro-scale of the interior experience. An example of a recent project that deliberately targeted the visual complexity of the interior experience is Mowhawk's 'Relaxing Floors'.

The firm 13&9, with the assistance of Dr. Richard Taylor, utilized research into fractals and wellbeing as the basis for an interdisciplinary project to create 'Relaxing Floors' for Mohawk. 'Relaxing Floors' (Fig 10) is a flooring solution that "utilizes fractals to give our eyes a break from the digital world and deliver the essence of nature to the contract built environment."³⁴

The fractal patterns used as inspiration in these modular carpets were developed using a type of computer programming called L-Systems. This project is a wonderful example of interdisciplinarity that manages to link scientific research with the practical application. However, it should be noted that the patterns are not in conversation with the history of ornamentation. A practical criticism of the

patterns comes from the location of their installation. Since one of the main characteristics of fractal patterns is self-similar scaled iteration, it follows that it is best to have the viewer approach the pattern and slowly discover its detail. This is a hard task to achieve with flooring, and much easier to achieve with wall covering. I suggest that applying the patterns to walls would be more successful in activating their fractal qualities within space.



Figure 10. Relaxing Floors designed by 13&9 and released by Mohawk. https://www.interiorsandsources.com/article-details/articleid/22645/title/mohawkevidence-design-carpet-patterns-reduce-stress

In my research, I use Designer Fractal Patterns (DFP) in context within an interior environment and measure the perceived wellbeing effects, i.e., positive vs. negative mood, visual interest, and visual preference. The DFPs used as visual stimuli in my research can be seen in Figure 12 to 17. These patterns were developed through a lengthy interdisciplinary process. The process began by researching many iconic patterns from different time periods and different styles with a global eye.

A collection of 50 patterns, exhibiting the promise of fractal qualities were chosen to be a representative sample. The 50 patterns were then shared with a focus group of mathematicians. Dr. Krystal Taylor, from The Ohio State University, was instrumental in this process. Her research focus is on fractal geometry and chaos math. With help from her and several of her graduate students, the 50 patterns were narrowed down to six using the outlined characteristics of DFPs. These chosen patterns were then modified by the author until they satisfied the characteristics as best possible. A checkered pattern was added to the six patterns, to act as a control, bringing the total number of patterns up to seven.

Decisions also had to be made concerning the scale and coloring of the patterns. This was done in collaboration with an architect. Salingaros speaks about "human scale" describing it as "... the sizes of the eye, finger, hand, arm, body, etc." ³⁵ It can be thought of as a natural measuring system, similar to the basis of the imperial measuring system. A light projector was used to modify each pattern's scale in real-time until a suitable scale was decided on. It must be noted here that the final scale of the pattern related very closely to human dimensions, of the width of a palm and the span of one's finger.



Figure 12. This pattern is modelled by the author after a pattern called "green Goose Waltz" designed by Robert Zakanitch, circa 1980. It is a pattern included in Anna Swartz's book Pattern and Decoration: An Ideal Vision in American Art. The pattern resemblances a fractal referred to as a Dragon Curve.



Figure 13. This pattern is modelled by the author after a pattern included in an abstract pattern anthology collected by Kyoto Shon. It resemblances a fractal called a Cantor Set.



Figure 14. This pattern is modelled by the author after a pattern called "Labyrinth" designed by Angelo Testa for Angelo Testa
CO., circa 1947. It is a pattern included in Leslie Jackson's book 20th Century Pattern Design. The pattern resemblances a Hilbert Curve.



Figure 15. This pattern is modelled by the author after a pattern designed by Richard Reimerschmid for Deutsche Nerkstatten, circa 1907. It is a pattern included in Leslie Jackson's book 20th Century Pattern Design.



Figure 16. This pattern is modelled by the author after a pattern included in an abstract pattern anthology collected by Kyoto Shon.



Figure 17. This pattern is modelled by the author after a pattern called "Anemone" designed by Neisha Crosland circca 1999. It is a pattern included in Leslie Jackson's book 20th Century Pattern Design.

The question of color is related to the concept of ecological validity. Ecological Validity is defined in psychology as "a measure of how test performance predicts behaviors in real-world settings. Although test designs and findings in studies characterized by low ecological validity cannot be generalized to real-life situations, those characterized by high ecological validity can be."³⁶ The concept of ecological validity puts real-world conditions at the center of research investigations. Since fractal wellbeing relationship rests on formal qualities of the patterns alone, it follows that the DFPs should be presented in black and white. However, real-world scenarios and ecological validity are important. Therefore, the final patterns were colored with a neutral tan color.

These visual stimuli will be used in two different types of sessions which are designed to collect responses to perceived wellbeing indicators: visual interest, visual preference and mood responses. The first session will enlist participants in a laboratory-type experiment to rate the perceived wellbeing effects of the pattern swatches through a forced-choice procedure, answering a prompt relating to each of the wellbeing indicators. The methodology is constructed to parallel the methodology used in precedence studies. Wherever a forced-choice method would not be appropriate, a Likert scale will be used.

This second session will embrace a participatory mindset and prioritize ecological validity. The DFPs will be projected to cover an entire wall within a well-lit room. The participants in the room will be asked to communicate their perceived wellbeing. Several mapping activities will be carried out to establish responses to visual interest, visual preference and mood responses. Other responses will also be collected in this session such as spontaneous utterances, and observable behaviors.

CONCLUSION

I hope for my work to stand in the chasm between the theory and practice of design research and help to fill it. It is important to use the knowledge attained from this investigation to strengthen designers' evidence-based decisions that remain loyal to human-centered design, putting wellbeing above design dogma and style hegemony.

NOTES

¹ Noor Murteza, "Perceived Wellbeing Effects of Designer Fractal Patterns: Visual Complexity and Interior Spaces," in *IASDR Conference* (Manchester,UK: IASDR, 2019).

² Stefan Sagmeister and Jessica Walsh, *Beauty* (New York, NY: Phaidon Press Inc., 2018).

³ Paul Downton et al., "Biophilic Design Applications: Putting Theory and Patterns into Built Environment Practice," *DesTech Conference Proceedings The International Conference on Design and Technology* 2017 (2017): 59–65, https://doi.org/10.18502/keg.v2i2.596; W.D. Browning, C.O. Ryan, and J.O. Clancy, *14 Patterns of Biophilia*, ed. Frederick Law (New York, NY: Terrapin Bright Green, LLC., 2014).

⁴ Murteza, "Perceived Wellbeing Effects of Designer Fractal Patterns: Visual Complexity and Interior Spaces."

⁵ (Browning, Ryan, & Clancy, 2014, p.11)

⁶ (Browning et al., 2014, p.11)

⁷ Yannick Joye, "An Interdisciplinary Argument for Natural Morphologies in Architectural Design," *Environment and Planning B: Planning and Design* 33 (2006): 239–52, https://doi.org/10.1068/b31194.

⁸ Christopher Alexander et al., A Pattern Language (New York, NY: Oxford University Press, 1977).

⁹ James Kunstler, "How Bad Architecture Wrecked Cities," Ted Talks, 2007, https://www.youtube.com/watch?v=Q1ZeXnmDZMQ.

¹⁰ Downton et al., "Biophilic Design Applications : Putting Theory and Patterns into Built Environment Practice," 63.

¹¹ Browning, Ryan, and Clancy, *14 Patterns of Biophilia*, 10.

¹² Rinku Parashar and Abir Bandyopadhyay, "Fractals, Architecture and Sustainability," *Recent Research in Science and Technology* 6, no. 1 (2014): 93–96, http://recent-science.com/.

¹³ (Falconer, 2003)

¹⁴ (Joye, 2007, p.318)

¹⁵ Browning, Ryan, and Clancy, *14 Patterns of Biophilia*.

¹⁶ Belal Abboushi et al., "Fractals in Architecture : The Visual Interest, Preference, and Mood Response to Projected Fractal Light Patterns in Interior Spaces," *Journal of Environmental Psychology* 61 (2019): 57–70, https://doi.org/10.1016/j.jenvp.2018.12.005; A. Forsythe et al., "Predicting Beauty: Fractal Dimension and Visual Complexity in Art," *British Journal of Psychology* 102 (2011): 169–80, https://doi.org/10.1348/0007.

¹⁷ Abboushi et al., "Fractals in Architecture : The Visual Interest, Preference, and Mood Response to Projected Fractal Light Patterns in Interior Spaces"; R Taylor et al., "The Implications of Fractal Fluency for Biophilic Architecture" (International Society of Biourbanism, n.d.); Browning, Ryan, and Clancy, 14 Patterns of Biophilia; Forsythe et al., "Predicting Beauty: Fractal Dimension and Visual Complexity in Art"; Caroline Hagerhall et al., "Investigations of Human EEG Response to Viewing Fractal Patterns," Perception 37, no. 10 (2008): 1488-94, https://doi.org/10.1068/p5918; Joye, "Fractal Architecture Could Be Good for You"; Richard Taylor, "Reduction of Physiological Stress Using Fractal Art and Architecture," The MIT Press 39, no. 3 (2006): 245-51; Florence Williams and Aeon, "Why Fractals Are So Soothing," The Atlantic, 2017, https://www.theatlantic.com/science/archive/2017/01/why-fractals-are-so-soothing/514520/.

¹⁸ (Salingaros, 2004, p. 79)

¹⁹ (Salingaros, 2004, p. 79)

²⁰ Salingaros, "Architecture, Patterns and Mathematics"; Yannick Joye, "A Review of the Presence and Use of Fractal Geometry in Architectural Design," *Environment and Planning B: Planning and Design* 38 (2011): 814–28, https://doi.org/10.1068/b36032.

²¹ Alexander et al., A Pattern Language, 1151.

²² Joye, "A Review of the Presence and Use of Fractal Geometry in Architectural Design."

²³ Falconer, *Fractal Geometry*.

²⁴ Murteza, "Perceived Wellbeing Effects of Designer Fractal Patterns: Visual Complexity and Interior Spaces."

²⁵ Zohreh Kiani and Peyman Amiriparyan, "The Structural and Spatial Analysing of Fractal Geometry in Organizing of Iranian Traditional Architecture," in *Urban Planning and Architecture Design for Sustainable Development* 216 (2016), 766–77, https://doi.org/10.1016/j.sbspro.2015.12.074.

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²⁷ Salingaros, "Architecture, Patterns and Mathematics."

²⁸ Kiani and Amiriparyan, "The Structural and Spatial Analysing of Fractal Geometry in Organizing of Iranian Traditional Architecture"; Murteza, "Perceived Wellbeing Effects of Designer Fractal Patterns: Visual Complexity and Interior Spaces."

²⁹ Charles Jencks, *The Story of Post-Modernism* (Hoboken, NJ: John Wiley & Sons Inc., 2011).

³⁰ Ibid.Jencks.Jencks.Jencks.Jencks.Jencks.Jencks.

³¹ Ibid.

³² Zaynab Ziari, "Ravensbourne College by Foreign Office Architects," Dezeen, accessed April 1, 2020, https://www.dezeen.com/2010/09/13/ravensbourne-college-by-foreign-office-architects/.

³³ Jencks, The Story of Post-Modernism.

³⁴ "Relaxing Flooring," Mohawkgroup, accessed April 1, 2020,

https://www.mohawkgroup.com/carpet/collections/relaxing-floors.

³⁵ Salingaros, "Architecture, Patterns and Mathematics," 79.

³⁶ "Ecological Validity," Britannica, accessed March 22, 2019, https://www.britannica.com/science/ecological-validity.

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DESIGNING FUTURE MEMORIES: AN EVIDENCE-BASED SELF-HELP INTERVENTION TO PROMOTE USER WELL-BEING

Authors:

JEREMY D. FAULK, CLARA DEWEY, OLUWANIFEMI OLUWADAIRO, CARLOS AGUIAR, JUNGKYOON YOON

Affiliation:

CORNELL UNIVERSITY, DEPARTMENT OF DESIGN + ENVIRONMENTAL ANALYSIS, USA

INTRODUCTION

Designers who consider users' experiences in their designs typically focus on users' emotions during the moment of interaction. Yet elevating one's view beyond the moment of interaction can enable designers to consider more enduring design-mediated outcomes such as *well-being*. Yet, how does one begin to design for user well-being?

Since 1990, psychologists have formalized many theories about how humans maintain happiness and flourish. This decades-long effort, collectively known as *positive psychology*¹, has yielded an emerging, interdisciplinary field called *positive design*² which employs empirically validated theories into effective interventions to increase happiness. These interventions are often activity based³.

Savoring Strategies

Research on well-being suggests that individuals experience greater well-being when they take regular actions to upregulate positive emotions⁴. *Savoring*² is one of such behaviors, and its impact on happiness has been measured extensively⁵. For the purposes of the current study, the authors selected among savoring strategies known either to augment or prolong positive emotions.

- Positive Mental Time Travel (PMTT) involves prolonging desirable emotions by anticipating a positive event or by reminiscing about them. For example, one may fondly recall a trip to the Florida Everglades while looking at a porcelain alligator on one's bookshelf.
- Capitalizing involves sharing positive experiences with others through stories (i.e., prolonging) or sharing positive experiences with others as they happen (i.e., amplifying). For example, a grandmother who tells her co-workers about her new-born granddaughter.
- Being present can amplify positive experiences by directing one's attention to the details of the present moment, increasing the "depth" of experience. For example, carefully observing how the wind feels.

Design for Savoring

A growing body of empirical literature demonstrates how design-mediated tools can support user well-being. Such designs fall under the broad category of *positive psychology interventions (PPIs)*⁵ along with other forms of intervention such as self-help books and counseling. A sub-category of PPIs, called *behavioral intervention technologies (BITs)*⁶, captures myriad positive design products such as smartphone applications and card decks with unique interactive prompts⁷. The current case study describes the initial development and testing of a prospective BIT aimed to promote user well-being.

THE DESIGN PROCESS

The principal design goal was to support user well-being through an interactive product. Two performance requirements emerged during early planning sessions: The product should (1) bring a sense of awareness to one's daily life, and (2) amplify and/or prolong positive emotions through savoring strategies.

Word Prompt Development

A popular approach to positive psychology is to formulate well-being-enhancing activities and trainings as communicated through books and person-to-person counseling. In contrast, design approaches may investigate the impact of artifacts and everyday activities as creators and mediators of well-being⁸. Carefully designed artifacts can help users establish novel, well-being-enhancing activities throughout the day. Thus, the approach to the current intervention was to provide prompts that could be adapted to users' everyday mundane activities, thereby increasing the likelihood of the activities' personal significance and pleasurableness. For this reason, it was decided that prompts should be open-ended such that users could interpret them in their own way.

The first author devised an interaction structure in which users would receive an open-ended prompt and be asked to find some intentional action to take as inspired by the prompt. As part of the design process, the first author originated eighty potential word prompts intended to be brief, nonprescriptive provocations of positive action (e.g., "secret dance", "we got this", "that was fun"). These eighty prompts were evaluated by three co-authors and one additional judge using a five-point hedonic Likert scale along with an informal exercise wherein judges attempted to originate two activities within thirty seconds as inspired by each individual prompt. The top-scoring ten prompts were identified using a combined total score of these exercises.

Affordances for Savoring Actions

The authors sought to develop a user experience that would weave the savoring strategies -PMTT (i.e., anticipating/reminiscing), *capitalizing*, and *being present* - into user interactions. Affordances for savoring actions included periodic direction such as "find a way to share your prompt-inspired action with someone else" (i.e., capitalizing), or, "be mindful of your senses while performing your chosen action" (i.e., being present). One explicit savoring activity involved asking users to verbally recount "the most interesting story that happened as a result of the game" (i.e., reminiscing).

USER STUDY

The authors developed an exploratory study to examine users' emotional experiences as a result of interacting with the prototype. Three goals of the study were: (1) determine whether the product caused positive experiences for users, (2) observe whether reflection (i.e., PMTT) led to an improved emotional state, and (3) assess users' emotional reactions to the product itself.

Experimental Design and Participants

The study utilized a one-group, pre-post-test, non-experimental design. A convenience sample of six users (3 f; aged 20-24) was selected from a participant pool of undergraduate students at Cornell University.

Apparatus and Setting

The five selected prompts were printed on cardstock cut to the size of business cards (see Figure 1). Prompts and daily instructions were placed into five individually-sealed envelopes with labels for each day of the week.



Figure 1. These five prompts were sealed with daily instructions inside envelopes

A packet of five envelopes with daily instructions was prepared for each user (see Figure 2). All measures were deployed using SusaGroup's online research tools^{9, 14}. Video diaries were captured with user-owned devices, and SPSS 25 was used for all statistical analyses.



Figure 2. A packet with five envelopes was prepared for each user

Constructs and Measures

Note that the concept of consumer-product attachment¹⁰ was employed with the assumption that users would associate the emotional quality of their product-facilitated experiences with the product itself. Following this rationale, the user's emotional reaction to the product was intended to be a "marker" of the user's product-mediated experiences.

Photographic Affect Meter (PAM)

Affective states have been found to influence users' perceptions and judgements¹¹, thus, the designers attempted to capture user mood at the start of each session using the PAM¹², an instrument for rapid mood assessment. In the PAM, the user selects a caricature to express their current mood: excited, cheerful, relaxed, calm, bored, sad, irritated, tense, and neutral (see Figure 3). PAM has shown strong construct validity across studies.



Figure 3. An example of a PAM mood caricature (there are nine total)

Product Emotion Measurement Tool (PrEmo)

To assess users' affective responses to the prototype, the researchers employed the PrEmo¹³. This measure captures seven pleasant and seven unpleasant emotions using two-second audiovisual animations. Users gauge the intensity of their affective reaction to the product across each emotion animation using five-point Likert-type scales (see Figure 4). Instructions state, "To what extent do the feelings expressed by the characters correspond with your own feelings towards the product?"



Figure 4. Example of an animation still shot in the PrEmo

Positive and Negative Affective Scales (PANAS)

The PANAS is a well-established self-report measure of subjective affect in the field of intrapersonal psychology¹⁴. The measure includes two ten-item, word-based mood scales. The first scale targets positive affect and the second scale targets negative affect using 5-point Likert scales. The instructions can be adapted to target state-based mood or stable affect over time. For the current study, the instructions were targeted towards mood: "Indicate to what extent you feel this way right now, that is, at the present moment." This measure was chosen to highlight any differences in emotion after the post-study reflection exercise.

Reflection Exercise

On Day Five, users were instructed to record a brief video/audio clip reflecting upon their experiences using Future Memories. The instructions asked: (1) "What was the single most interesting story that came from using the Future Memories cards?", and (2) "What was the single greatest benefit from interacting with these cards?" These questions were adapted from an evaluation methodology called *ripple effects mapping* (REM)¹⁵.

Additional Questions

Nine additional questions were included on Day Five. Users were asked where they physically kept the cards during the day, how many days they completed the exercise, and how often they might want to interact with the cards. Users were also asked whether they enjoyed interacting with the prototype and to what degree they felt the designers had considered the clarity of interaction generated by the prototype. They were also asked to share their ideas for potential improvements. Finally, demographic information was requested.

PROCEDURE

The study was conducted over five days during Spring 2019. Users were informed during recruitment that they would be compensated with a \$10 gift card. In order to maintain anonymity, users' individual study packets featured a unique letter that could be entered into the online questionnaires. The five prompts chosen for this study were: "secret dance," "sleight of hand," "turn it around," "you got me," and "one thing." Prompt order was held constant across users. Participants were instructed to open the day's envelope in the morning starting on a Thursday and ending on a Monday. Inside each envelope, the user found one prompt card, daily instructions, a time estimate for the day's activities, and periodic URLs to online questionnaires. The order of measures given on the questionnaire was held constant across three data collection days (see Table 1).

Day 1	Day 2	Day 3	Day 4	Day 5
РАМ	-	PAM	-	PAM
PrEmo	-	PrEmo	-	PrEmo
-	-	-	-	PANAS 1
-	-	-	-	Reflection Exercise
-	-	-	-	PANAS 2
-	-	-	-	Additional Questions

Table 1. Measures across five days of product interaction

On Day Five, the questionnaire included the two PANAS measures. The first PANAS measure was completed immediately before the one-time reflection exercise and the second was completed immediately after the user reflection exercise.

RESULTS

Quantitative Results

Across Days One, Three and Five there was a trend of neutral-to-positive characters selected in the PAM for four-out-of-six participants, indicating that participants' moods were not the major determinant for their subsequent responses.

Users' Emotional Evaluations of the Product

The results of the seven positive and seven negative emotion ratings of the PrEmo were separately averaged to produce valence means (1-5 scale) that summarize users' emotion-oriented evaluations of the product over time. Descriptive comparisons showed positive emotional evaluations decreasing from Day One (Mean = 2.98, SD = 1.01) to Day Five (Mean = 2.50, SD = 1.51). Negative emotional evaluations increased between Day One (Mean = 1.33, SD = 0.52) and Day Five (Mean = 1.74, SD = 0.76).

Users' Emotions Pre- and Post-Reflection

In the pre-post reflection PANAS measures, a paired sample t-test (two-tailed) revealed a statistically significant difference in means (p = .013) between the pre-reflection (Mean = 1.75, SD = 0.48) and post-reflection (Mean = 1.47, SD 0.39) PANAS scores. Overall, negative affect was reduced by a mean score of 0.28 (SD = 0.18) (sig. 0.05) after the reflection exercise.

Qualitative Results

A variation of *naturalistic inquiry method*¹⁶ was used to identify themes in the user reflection recordings. All user comments were transferred onto index cards and sorted into emerging categories by each of the first three authors (i.e., cards were sorted three times). Next, the researchers collectively finalized the emerged categories. Six themes emerged: (1) Positive Reactions to the

Game, (2) Negative Reactions to the Game, (3) Personal Empowerment, (4) Being Present, (5) Solo Activities, and (6) Group Activities.

Positive Reactions to the Game

Three out of the five participants expressed enjoyment interacting with the game, saying that it was "fun," or they "loved" the game. One participant described the game as "almost like a scavenger hunt."

- "I really, really, really loved this game."
- "I loved waking up in the morning, tearing open an envelope and seeing what kind of challenge I had that day."

Negative Reactions to the Game

Two participants expressed a lack of engagement and benefit from the product interaction. One participant stated that they were "totally unsuccessful every single day at incorporating the cards into [their] day," and this was because "the words were 'somewhat too abstract'." Two participants experienced difficulty incorporating the game into their day as they were quite busy. One comment revealed that excitement for the game began to lessen as the stress of their week increased: "On the first day, I was still super excited about [the game], and I wasn't that busy..."

Being Present

Three out of five participants had quotes in this category. Eight direct quotes related to *being present* with five quotes discussing how the game caused changes in behavior and caused the user to live more in the moment. Two additional quotes were about a specific experience in which a participant was thinking about their relation to others in the present moment. One quote was about the user's general struggle to live in the present moment and how this led to difficulty participating in the game.

- "I put a lot of thought into what I would be choosing and because of that, I think I was living a lot more in the moment."
- "I definitely found myself more focused on what I was doing, less so with peripherals or getting distracted with my phone."

Personal Empowerment

Six quotes fell into this category. Two participants shared how the game highlighted empowerment of personal choice. One quote revealed that one prompt "actually made [her] do things [she had] been meaning to do for a while," some of which she had "subconsciously wanted to do anyway." Two other quotes discussed a sense of "freedom" engendered by the cards.

• "The single greatest benefit from interacting with these cards was realizing and remembering throughout the day that I have so much power over my choices."

Solo Activities

Two users described performing solo activities as a result of the prompts.

- "I had a solo dance party in the bathroom stall [...]. It gave me this secret party that no one knew about but me."
- "I thought about 'one thing' I had been meaning to do all week but had been pushing off, which was reading my book."

Group Activities

The game encouraged three participants to engage in social activities. Overall, participants who engaged in prompt-inspired group activities expressed a high degree of enjoyment (e.g., "we had a blast!"). One participant expressed that they wished there were "more group challenges."

"Me and a few other people in the classroom were joking around and dancing in the back"

"I got closer to people that I wouldn't have met if I didn't go on the wine tour."

LESSONS LEARNED AND DISCUSSION

Results suggest that *Future Memories* may facilitate design-mediated positive experiences when users are personally invested in the product interaction. The product appeared to encourage users to act upon their unconscious desires and to seek new possibilities in their everyday lives.

Those who completed daily product interactions reported more positive evaluations and fewer negative evaluations of the product than those who did not complete daily interactions. The main reasons users gave for negative product reactions were a lack of connection to the abstract nature of the prompts and a lack of time and energy to engage with the product. A future design iteration should encourage user investment and help potential users to recognize the time and energy requirements of the game. Furthermore, a more systematic approach to selecting prompts should be employed in order to reach an appropriate level of abstractness.

The savoring activity of PMTT (reflection) may have improved users' emotional states by reducing negative emotions, however, the preliminary, pre-post design does not account for the possibility of user hypothesis guessing. Regarding other savoring strategies, qualitative feedback from invested users suggests that the product may combine particularly well with savoring strategies related to *being present* and *capitalizing*. To examine this possibility in greater detail, future studies may wish to assess the extent to which users' basic psychological needs are supported by the product, as per the Positive Activity Model⁶. For example, if users report that product interactions contributed to a basic need for "connection to others," this would encourage the designers to favor *capitalizing* savoring strategies. A future study should include the Savoring Beliefs Inventory¹⁷ to account for users' responsiveness to savoring strategies in general. Finally, a future study should examine how product interactions impact measures of user well-being over time.

CONCLUSION

Future Memories appears to empower invested users to act upon their positive subconscious desires by providing reflective prompts that gently remind users of unseen options during their daily lives. Future product iterations will be guided by the findings of this preliminary study and the authors hope that others will find elements of this approach useful for their own projects.

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THE RESIDUAL SPACE: EXPERIENCE-BASED METHODS

Author: CARLEY RICKLES

Affiliation:

THE CREATIVES PROJECT, GEORGIA TECH MSUD (2019), CARLEY RICKLES STUDIO

INTRODUCTION

The constructed environment must exist in comparison to something else. To comprehensively understand a city's urban design, this study explores its inverse: the leftover landscape within the urban form or the residual space. The Residual Spaces Study was conducted in Atlanta from August 2018 to March 2019 and has continued as a social practice. The study and its associated public engagements explore found residual spaces outside of common, everyday public life. Throughout these explorations, over 75 miles of residual spaces were examined within Atlanta's urban form. This paper focuses on the resulting experience-based methods for discovering, interacting, and documenting the residual spaces of Atlanta's urban design. In conclusion, this paper asks: How can spending time experiencing undocumented, leftover places influence the practice, pedagogy, and research of urban design?

RESIDUAL SPACE AND URBAN DESIGN

Does residual space exist as a reaction to place? How do urban designers study non-spaces? Does studying vague spaces, outside of capitalist production standards, but still within the urban form, bring out alternative formats for urban designers to understand and experience urban design? Through an unrestricted yet methodical research practice, the Residual Spaces Study was informed by existing everyday spaces, better characterized as residual spaces.



Figure 1. "Urban Design and The Residual" process sketch.

My definition of "residual space" is guided by Margaret Crawford, John Kaliski, and John Chase's *Everyday Urbanism* and Ignasi de Solà-Morales' "Terrain Vague." The Residual Spaces Study and its associated projects aim to activate the principles behind Everyday Urbanism theory while highlighting undesigned counterspaces similar to those Solà-Morales' defined as *terrain vague*. The critiques, anecdotal accounts, and perspectives brought forward in this literature seem to further evolve the midcentury shifts from modernist urbanism to a new set of values based on the observation and architectures of everyday experiences.¹

While *Everyday Urbanism* serves as a theoretical reference for understanding and studying residual spaces within the context of urban design, "Terrain Vague" serves as a reference, in alliance with Everyday Urbanism, for how urban designers ought to define and value residual spaces. I interpret "residual spaces" as analogous to what Solà-Morales called "terrain vague," described as "unincorporated margins" and "foreign to the urban system, mentally exterior in the physical interior."² The Residual Spaces project is an effort to embody these theoretical texts in practice.

On Experience-First Methods Through Activated Questioning

If residual space exists as a reaction to place without outside incentivized economic goals, then its study ought to create alternative formats for understanding the city and a new set of values for understanding space.³

How can experiencing spaces teach us more about the city? Chase, Crawford and Kaliski introduced the potential for the urban designer to value lived experience over architecture. The literature puts as much emphasis on "looking at the city" as it does "making the city."⁴ *Everyday Urbanism* brought important but neglected aspects of the lived-in city to the forefront of discussion. Crawford credits theorists Henri Lefebvre, Guy DeBord, and Michel de Certeau as the "pioneers in investigating the completely ignored spheres of daily existence."⁵ In other words, "the everyday" or "lived experience" is considered by Crawford and the three theorists to be "more important than physical form in defining the city" further determining "urbanism to be a human and social discourse." It was a "call to action" proposing that if urban design influence could "arise from the lived experience," then urbanism and architectural fields could reflect a better understanding of everyday life. ⁶

In a 2017 essay titled, "Curious Methods," Karen Lutsky and Sean Burkholder describe their alternative approach to studying space based in an "open-ended, ground-level exploration." They

argue that relying on methods for proving "glorifies a finite 'truth' and shuts down the process of inquiry." They offer instead to actively probe or to question based on experience as a better method for the study of constantly fluctuating landscapes. They further define "probing" as: a mode of exploration that informs but does not limit, a creative process that involves asking and enacting questions, and a non-linear analysis comprised of inquiry, insight, and impression.⁷

Guiding Principles

Building on Burkholder and Lutsky's suggested "probing" method and Crawford's call to action, I developed a multi-pronged approach for field research and analysis based on the following principles:

1. Form an understanding of place based on experience, not to plan for its change.

2. Engage in an open-ended exploration without an obvious beginning or end.

3. Reconsider "public," "space," and "identity" by looking beyond normative definitions of the architectures and cultures of public and private space.⁸

4. Shift from "professional expert" to "ordinary person"⁹

5. Utilize the non-linear inquiry, insight and impressions phases over the typical design process. 10

6. Rely on impromptu opportunities by acknowledging that time is cyclical, linear, and spontaneous¹¹

7. Use dialectical analysis as opposed thinking of good vs. bad.¹²

8. Base all actions, recordings, and findings on what happened during experience in the field, as opposed to conventional methods which rely on pre-recorded satellite imagery and data layers.

From these guiding principles, I developed a field research toolkit that allowed me to record, revisit, and ponder places that could only be visited temporarily under spontaneous conditions. I found that using lo-fi tools (such as a free video-mapping application, an iPhone camera, and a pocket-size notebook) allowed me to thoroughly record my experience, the physical elements surrounding me, and my geographic location in an unobtrusive way. This resulted in a comprehensive record that I could review at a later time for further analysis.

FINDING AND OBSERVING RESIDUAL SPACES

My field research was divided in two parts, resulting in 10 studies that explored over 75 miles of Atlanta on foot and bike. The first part, *The Other Side of I-20*, asked what residual spaces could be found walking along I-20 at street level. I examined over 22 miles of interstate on foot, completing four studies in over 50 dead ends. The second study, *The Other Side of Atlanta*, asked what residual spaces could be found if I increased mobility and overcame my perceived barriers about being alone in isolated space. To overcome my limits, I invited another person and sped up the exploration via bicycle. *The Other Side of Atlanta* probed over 50 miles of leftover space, completing six studies in over a dozen residual sites. Both parts utilized a toolkit for observation made up of a video mapping app, a pocket-sized notebook and pen, an iPhone camera, and a field work uniform.

Self

During my first field study along I-20, I found my research leading me to new places where I felt uncomfortable and vulnerable. From this, I came to understand the conflict between body and perception of space. This is a divide that can only be determined by ones felt experiences in space—it is speculative, yet physically inhibiting. I was faced with the realization that certain places at certain times can feel closed to certain bodies. I have always inadvertently complied with this as a woman,

but it became a glaring reality to me as I experienced discomfort while exploring unknown spaces. In Rebecca Solnit's *Men Explain Things to Me*, she writes of an experience of this invisible barrier through the lens of a female journalist in the city–who is afraid to walk home at night in her neighborhood. Should she stop working late? How many women have done so for similar reasons? ¹³ My field work forced me to acknowledge this divide in a personal way. In response it made me wonder how many other experiential barriers are driven by one's body and its gender, its race, its age, its ability, or its size. I questioned my own presence and what impression it might give those in residual space. It made me question if there was a proactive solution to overcoming this divide from the ground up.



Figure 2. Field entry on perception from first I-20 study - prior to wearing the jumpsuit.

To transcend cultural expectations, spatial biases and frankly, to continue doing my work, I came up with a method to conceal my identity. My theory was that if I could become the body-less researcher, and not the lone woman, perhaps I could avoid unwanted attention. So, how does one lose one's body? I found a simple solution: a "lab coat" approach emerging from a loose-fitting jumpsuit. Like the association of a lab coat with science-based research, a simple work outfit could conceal my identity and divert attention from my physical body. In addition to concealing my identity, my "lab coat" was worn as a performative measure to associate my body with setting.

Observational Methods

Several tools were used to record the experiential connection between self, residual space and city. Observational methods were selected based on their ability to be concealed and time efficient, allowing for a more engaged observer and easy movement. Walking and biking were the modes for field research. The physicality of walking and biking forced a need for reliable pocket-sized documentary tools. My Observation toolkit relied on interactive mapping, photography, and experiential documentation through writing and drawing.

To perform attentive-to-site research in these psychologically vulnerable settings, I needed a tool that could quickly record key details and track spaces to reference later. Several apps were used to track data analytics, site details, and photo/video evidence. An application called AlleysMaps, became the

main tool for tracking site and video information. AlleysMaps platform provided a high-quality wideangle video recording device linked to geolocation.¹⁴

This instant linkage of the body to a map allowed for quick multi-purpose tracking and recording of spatial circumstances. By tracking through a pocket-sized application, field research becomes visually activated (although I did not utilize the visual quality on-site) through a real-time geo-referencing map. Through standing on site with movements tracked hands-free, performative mapping became the alternative to a drawn plan view. The drawing medium was my body; the physical "plan" was the map available through the internet or app. The "plan" was not a proposal for the future—it was a moment stored for future reflection.

This shifts the plan view, or map in this case, from a stagnant object to a map of an experience in time. Similar to the section elevation, which records a visual cross section of reality, walking and biking create the lived experience, shown in a cross-section's cut line. Visualizations of existing topography were tracked through mapping apps, but more importantly experienced firsthand.

Walking and biking were the transportation methods for exploring residual spaces. These methods made sense for exploring residual zones, as sites were often away from the street and inaccessible via car. Experiencing the city as exposed to its environmental elements allows for the five senses to absorb surroundings. While biking allows for a faster pace and greater mobility, walking offers more detailed observations. The two are the performative measures linking movements to a map.

Walking has been used as a method for engaging spontaneously with urban geography for some time. I imagine it will continue to be a method for understanding the city indefinitely. In *Terrain Vague: Interstices at the Edge of the Pale*, walking is referenced as a "transurbance" which Patrick Barron describes as a "psychogeographic engagement with the idea of walking as a form of urban interventions, an autonomous form of art, a symbolic yet transformative act of 'negotiated' space, an aesthetic instrument of knowledge." He relates walking to an autonomous intervention, where the individual can viscerally experience a place and take in one's own interpretation based on feelings.¹⁵ Weekly written logs and on-site and post-field entries were recorded in journals. This allowed for empirical details to be recorded and examined. Important elements such as plant types, architectures, sounds, colors, and nuances were recorded. Significant time was spent traversing and investigating unknown sites through written and drawn accounts.

SUMMARY OF OBSERVATIONS

Residual Space Dualisms

Through my experiences walking, I found that there is no residual space without constructed space. The contradictory nature of how unconstructed residual spaces exist within the urban form echoes into four dualisms:

1. The leftover landscape appears outside of public or private use, leaving its purpose vague within the ordinary citizen's life.

2. While residual space is often referenced as a void, it can only exist in relation to a constructed environment. If cities are planned and designed, then the residual space is the undesigned aspect of a city.

3. Although during the study, no official entry points or paths lead to residual spaces, all spaces remained accessible and were typically found within walking distance of any urban area.

4. Their ecologies commonly consisted of graffiti, overgrown plants, human artifacts (such as clothing, trash, or informal housing), and wild urban animals (such as cats, rats, and crows) all typically existing within a constructed form, like a highway overpass, or defunct train track. Although

residual spaces are not part of ordinary life or typical urbanism conversations, their elements seem to repeat in cities across the globe.

Residual Sites

During the two studies, I found three physical conditions that typically form residual spaces:

1. They are abandoned or in the decay of what remains from a past designed space. Found examples include: 1) an abandoned rock garden designed by the renowned Atlanta landscape architect, William Monroe, for a family in the 1930s, 2) numerous vacant buildings along a vacant rail line that has since been developed into the Atlanta BeltLine, 3) a wooden sky deck that once functioned as a sports bar in support of the Atlanta Braves' former Turner Field, and 4) an abandoned neighborhood in the shadow of Hartsfield International Airport. Abandoned spaces found were typically privately owned, and often awaiting a planned development. Since the time of my field research, several abandoned sites have been re-developed.



Figure 3 shows a collage-analysis made up of photos and writing from a found abandoned neighborhood adjacent to Hartsfield International Airport.

2. They are formed by an infrastructural void, or the unused, unmarked landscape surrounding functioning infrastructure. Found examples include: 1) a quiet creek below I-85 and MARTA infrastructure left untouched, now a home to herons, humans, and old growth oaks, 2) an extensive underground network of parking spaces, overgrown parcels, and informal settlements known as "the Gulch," which fills the void of Downtown Atlanta's original street level, now supporting the street life above, and 3) a subterranean retired CSO facility. Infrastructural voids are typically owned by public agencies or governments; their residual footprints typically live untouched without change.



Figure 4 shows a collage-analysis made up of photos and writing from a found subterranean facility.

3. They are a result of dead ends, or the spaces caused by the abrupt end of a street. *The I-20 Study* investigated over 50 dead ends left over from Atlanta's urban renewal era divide, I-20. Found examples include: 1) a community garden and dog park between a highway sound wall and a multi-family housing complex, 2) a highly ecologically diverse informal settlement in a creek bed between a single family street and I-20, 3) a strolling park between an assisted living center and I-20, and 4) various dead ends from historic neighborhoods with views across I-20 to their former neighbors. This study found that most residual dead-end parcels belonged to the city or GDOT. They often provide safe spaces for children to play, for transient citizens to live, and for urban ecologies to thrive for long periods of time.



Figure 5 shows a collage-analysis made up of photos from dead ends along I-20.

RESULTING SOCIAL PRACTICE

Following field research, I began an ongoing public walking series titled *Embracing the Ugly Urbanism.*¹⁶ Through publicly sharing my work via social media and exhibition, I found that others often shared personal stories with me about their experiences in residual spaces. People in my community began to ask if they could come with me on my walks. There seemed to be a need for a platform that allowed people to explore places they either did not know existed or were too afraid to venture into alone. I created a walking series, *Embracing the Ugly Urbanism*, to provide a public platform for exploring residual sites in groups outside of my academic research. My social practice toolkit includes performative, video, and experiential mapping, discussion, worksheets, and my field work uniform. I have hosted six *Embracing the Ugly Urbanism* events and collaborated with several local artists, designers, and activism groups. *Embracing the Ugly Urbanism* is focused on teaching others about residual spaces and creating conversation on lived experience and urban design.



Figure 6 shows participants investigating the relationship between a historic country club and a polluted creek during an Embracing the Ugly Urbanism public walk.

CONCLUSION

My goal in studying residual space was to search for existing values and alternative methods for researching space. Through embodying the eight principles I derived from *Everyday Urbanism* and "Curious Methods" I developed an experiential methodology for researching space that can be applied to urban design and its associated fields' practice and pedagogy. Although there is no substitute for physically being in space, these tools give the person behind the research the ability to re-experience intimate details from sites during analysis and design phases.

In addition to developing an urban design-research toolkit, I found my experiences in residual spaces vital to my understanding of city form. I see residual spaces as half of a whole, a potential reason for design, or the result of its lapse. By allowing practice and pedagogy to be influenced by experience-based methods in residual spaces, instead of a city's intentional spaces, alternative perspectives on the urban landscape can surface. It is valuable for urban designers to study residual spaces to learn what kinds of inhabitants they host and what pieces of history they hold. These factors can tell stories of past and current displacement, ecological health, anti-normative activity, or community needs. By examining the residual, we learn much about design mistakes, resilience, marginalized communities, socio-geographic histories, and the current state of our urban ecological health

NOTES

¹ Significant chronological scholarly works that expanded the urban design profession to include a sociological perspective: Kevin Lynch's 1960 "Image of the City" provided insight on the perceptional experience of an ordinary citizen introducing imageability;¹ Jane Jacob's 1961 "Death and Life of Great American Cities" highlighted relatable, lived experiences, counter to urban renewal development and modernist urban design; Denise Scott-Brown, Robert Venturi, and Steven Izenour's 1972 "Learning from Las Vegas," presented an avantgarde approach to architectural research and emphasized focusing on urbanism's un-privy to architectural fields, new forms of graphic analysis and experience based design research. In addition to these literatures a deep inspection of Guy DeBord's influence in the Situationist International movement which provided methods for reclaiming the city through engagement and disorientation. These shifts in methods brought to the forefront a change in values and pedagogy for urban designers.

² Ignasi de Solà-Morales, "Terrain Vague", Anyplace (1995), 120.

³ For more on "alternative methods", see John Chase, Margaret Crawford, and John Kaliski, Everyday Urbansim, (2008), 12-15

⁴ John Chase, Margaret Crawford, and John Kaliski original Everyday Urbansim (1999) was divided into two parts: "Looking at the City" and "Making the City".

⁵ John Chase, Margaret Crawford, and John Kaliski, *Everyday Urbansim*, (2008), 7.

⁶ Ibid., 7-11.

⁷ In Sean Burkholder and Karen Lutsky's 2017 essay "Curious Methods", they further define inquiry as the process of asking and enacting questions; insight as that which is discovered through probing; and impressions as the representation of inquiry and insight phases.

⁸ See Margaret Crawford's chapter, "Blurring the Boundaries: Public Space and Private Life", Everyday Urbansim, (2008), 22-25.

⁹ John Chase, Margaret Crawford, and John Kaliski, Everyday Urbansim, (2008), 9

¹⁰ For more on the non-linear inquiry, insight, and impression phases, see Sean Burkholder and Karen Lutsky, "Curious Methods" (2017)

¹¹ For more on time and Everyday Urbanism see Crawford's sub-chapter "Time and Space" where she discusses Lefebvre, De Certeau, and Debord in Everyday Urbanism (2008), 9.

¹² Tommi Juhani Hanhijärvi's defines "dialectical thinking" as a way of problem solving through daily life. It is critically thinking with a consciousness of everyday paradoxes or "thinking in opposites" as a means to understand and reason with aspects of reality. For more on "dialectical thinking" reference Hanhijärvi, Tommi Juhani. Dialectical Thinking : Zeno, Socrates, Kant, Marx, Algora Publishing, 2015.

I define dialectical analysis as thinking in opposites, recognizing self in relation to life around me

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ELDERLY-FRIENDLY INTERIOR DESIGN

Author: CHANDNI LUHADIYA

Affiliation: UNIVERSITY OF ALBERTA, CANADA

INTRODUCTION

The world is experiencing a period of the intense demographic shift in two areas: Ageing and Urbanization. In 2017, the global population aged 60 years or above numbered 962 million and is expected to reach nearly 2.1 billion by 2050.¹ Moreover, the world's population is becoming more urbanized. By 2050, around 66% of the world's inhabitants (almost 100 billion) will be urban dwellers.² In a recent AARP survey, 3 out of 4 seniors prefer to age in place.³ Ageing in place is a popular term, which means the ability to stay in one's own home safely and comfortably for as long as possible.⁴ Even when older people experience physical and cognitive functionality decline, the home has been identified as the first preference to receive personal care.⁵ The most common reasons provided by older people for declining to move to an assisted living community are the sense of independence, autonomy, and connection to friends and family which they get only at their home where they have been living for a long time.⁶ This gives rise to the high demand for residential space design which is suitable for older adults. With age, gradual changes occur in vision, hearing, balance, coordination, and memory. Elderly-centered interior design can enhance the quality of life of the elderly by creating an environment suitable for their needs. A well-designed home can evoke positive emotions among its inhabitants and can support in various physical activities. It is not only about living a safe and long life, but it is also more about the ability to live independently in space which is personalized according to their interests and requirements. Interior design follows a holistic approach that seeks to engage and develop the physical, emotional, mental and spiritual aspects of the seniors.⁷

Research question

How can interior design positively influence the psychological and physical well-being of senior citizens?

Approach

To answer the above question, this study analyzes 4 interior design elements which are lighting, flooring, staircase and furniture to understand how it can assist adults with general mobility decline due to ageing and how it can positively influence the psychological well-being.

LIGHTING

Lighting plays an integral role in the interior environment. A well-designed lighting system not only allows an individual to perform their daily activities easily and safely but also directly impacts their emotions. As the elderly spends most of their time indoors, it is crucial to provide an optimum lighting system in the built environment. The illuminance requirement in each space differs with age. Elderly people require three times more illuminance level in the space to carry out daily activities compared to a young person in twenties.⁸ According to Chrono biologist Dr. Benjamin Smarr, all human organism require exposure to day light to maintain their circadian rhythm.⁹ Circadian rhythm is the biological clock which releases chemical and hormones in the human body including melatonin hormone that triggers our body to sleep. Insufficient daylight can affect sleep patterns, productivity and can disrupt circadian rhythm. In the long term, this can lead to problems such as cancer, depression, anxiety, dementia, and even infertility.¹⁰ Therefore, it is important to integrate daylight in the interior environment. However, as elderly people are sensitive to glare, any wrong decision in designing openings in the house can cause glare which can lead to serious falls. Shading systems like multi-layer drapery, window blinds, glazing, low visual transmittance, light shelves can help to reduce glare.

Although natural light is crucial, it is not sufficient to accomplish daily tasks. This inadequacy necessitates the use of electric lighting in the interior spaces. One of the most common approaches to achieving the required illuminance level in interior space is through layered lighting design.¹¹ This approach uses three layers: ambient layer (also referred to as general lighting), task layer and accent/decorative layer. Ambient light allows an individual to perform basic tasks like walking around, having conversations, etc. It is the basic layer of lighting which should be there in all the spaces which require general use along with other needs. The second layer is the task layer which illuminates a specific area that requires higher illuminance level compared to the general ambience. For instance, activities like reading, sewing, cooking require more directed light which can be fulfilled by task lighting. The third layer of light is an accent or decorative light which is used to highlight an architectural feature or specific decorative art like picture frames etc. The proper combination of these three layers of light evokes positive emotions and allows them to safely make use of the space for specific tasks.¹² Each interior space has different illuminance requirements for seniors. A bedroom should have 500 LUX, the living room should be between 300-1000 LUX, the kitchen should have 500 LUX level and the toilet can be 200-500 Lux level. All these places should have a maximum amount of light at areas near floor.¹³ Motion sensors light can also be installed near flooring which can give elders a sense of safety while walking alone in the night.

The above discussion is for the areas which have at least some access to natural light. However, there are several interior spaces which do not have any window, doors, etc. to allow daylight inside the space. As we have discussed above, insufficient daylight or improper illuminance disrupt circadian rhythm which causes irregular sleep patterns. This negatively influences the psychology of the elderly. To solve this problem, a tunable light has been developed. This tunable light mimics the daylight in interior space. This lighting system automatically adjusts according to the time of the day, similar to the outside illuminance level. This can also be manually adjusted or integrated with voice-enabled virtual assistants like Alexa, which can make it easier for elders to interact with it.¹⁴
STAIRCASE

When an elderly has to travel between floors, climbing up the stairs is one of the most challenging tasks and is associated with a high risk of collapsing. Also, a poorly designed staircase has a negative impact on elders' psychology as they develop a loss of confidence and fear of accidents. This is the reason why the location of their bedroom should be on the main floor to avoid frequent usage of stairs. However, a staircase designed by keeping in mind the ergonomics and usage patterns of elderly can make it easier for everyone including the elderly to move between floors. Staircase design comprises of for different elements: Geometry, handrail, lighting, and step design. Careful consideration of each element (further divided into sub-elements) plays a crucial role in reducing the risk factor of overall staircase design.

Geometric design

The geometrical design of the staircase depends on the two most important design features: configuration of the stairs and the number of steps per flight. There are various types of staircase like U shaped, straight, spiral, helical, stairs with or without landing and combination stairs. Also, long flights (over 12 steps per flight) and short flight (less than 6 steps per flight) contribute to the overall risk factor of the design. The most optimum design for the elderly is U shape structure with steps less than 12 per flight. The design with the high-risk factor is the combination stairs as the dimension and shape of step difference can cause confusion amongst elders.¹⁵

Handrail design

A well-designed handrail is the most effective way to prevent accidents on stairs due to loss of balance. The optimum handrail design depends on several elements of the handrail. Firstly, in the case of the elderly, it is crucial to have a handrail on stairs. Stairs without handles pose a huge risk to the elderly due to their inability to take support while falling. In this case, adults may avoid transitioning between floors. This can often lead to isolation or can hinder in performing important tasks. Secondly, the height of the handrail should be according to the ergonomics standards of old age people. For elders, the optimum handrail height is 910mm-970mm. Thirdly, the shape of the handrail should be corresponding to the grasping capability of seniors. Rough textured and cylindrical or oval-shaped cross-sectional of a handrail is strongly recommended for elderly users (Figure 1). Moreover, it is recommended to extend the handrail to landing and even on another floor between 320 mm to 480 mm for at least one handrail. This makes it easier for adults to step off the stairs with ease. Finally, the distance between the wall and handrail also plays an integral role in the staircase design for old people. The inappropriate distance can restrict elders to grab the rail for support. The recommended distance between the wall and the floor is 57mm-75mm.¹⁶



Figure 1. Grasping study shows circular handrail cross section is optimum for elders (Image by Alison C. Novak, 2013)

Lighting on stairs

The optimum illumination for the staircase designed for the elderly is 300 LUX. Moreover, light consistency is also another important factor. Inconsistent light can create shadows that can develop confusion and can result in falls. Also, the light switch should be a 2-way switch and should be located away from the staircase. Switches along the flight can divert the mind of elders and can result in accidents.¹⁷

Design of tread and riser

The optimum step can motivate adults to climb up the stairs and also prevent accidents. The tread depth should be between 280mm-330 mm and the riser should be between 152mm - 192mm. To make the staircase more rounded, nosing with a depth between 15mm-25mm can be provided. Also, the finishing material of the steps should be uniform (avoid any patterns) and slip resistant.¹⁸

FLOORING

When a person slips due to mobility issues, the flooring material plays a major role in the level of impact the person experiences after falling. Safety is the most important aspect for everyone and especially for the elderly when it comes to interior design. Tumbling down and getting hurt can affect health and well-being plus it can add up to the medical bills. There are various types of soft flooring. However, the flooring material in homes depends on whether an individual uses a walker, a wheelchair or a cane.

As seniors are more sensitive to a colder climate, carpet flooring can be a good option at least for their bedrooms. Carpets are softer and warmer and provide more cushioning to the person collapsing. They are also less slippery and usually cost the same as tiles. However, carpet flooring is harder to maintain and clean as compared to hardwood flooring.¹⁹

In the case of hardwood flooring, cork flooring is an option that is not very hard on feet and is waterresistant. However, it is difficult to maintain and require proper techniques to clean the surface. For elders, tile flooring is the least preferred option. Tiles can be extremely slippery when they are wet which increases the risk of accidents. Also, they are very hard and cold on feet which makes it difficult to walk barefoot during winters.²⁰

Flooring materials in the house can be split by putting carpet or soft flooring in the bedroom and the hardwood floors in the other areas like kitchen, living or bathroom depending on the requirement. For bathroom, sheet vinyl flooring can be a good option as it has some cushioning built into it which is not available in tile flooring. This provides more shock absorption and ease of navigation. In the case of stairs, low pile carpet flooring is one of the safest options for everyone including adults. It is soft and has shock absorption capability.²¹

Apart from materials, flooring patterns should be highly considered when designing for elderly. Older adults have low vision quality and therefore dark and stripe patterns can appear like holes to them. This not only affects their mobility but also negatively impact them psychologically. Also, due to reduced vision in elderly, high contrast is required between flooring color and wall color especially the edges. This can help them easily see the difference and prevent tripping.²² Low contrast makes hard to differentiate from one thing to another. Even the staircase should have high contrast with the flooring color. This will allow elderly to easily see the stairs and navigate. Too many colors and patterns are also detracting and dazzling which can lead to falls.

FURNITURE

Furniture is the core element in providing functionality to the interior space. The type of furniture to use depend on its function like sleeping (beds), eating (table), seating (chair). Elderly friendly furniture in interior space would be ergonomically designed by considering the anthropometric dimension of old age people. For example, any kind of seating furniture with seat depth 20", seat height 18-20" and arm height of 24"-25" will be appropriate for older adults.²³ Similarly, the dimension for higher shelves or cabinets should consider the reaching height of the arms of elderly. Inappropriately scaled furniture can lead to discomfort and may cause serious injuries. Rehabilitation professionals are experts in dealing with age-related changes among elderly and have in-depth knowledge about ergonomics of senior adults. Industrial designers often collaborate with professionals from gerontology and rehabilitation to design products that could help adults cope up with their age-related problems.²⁴

Apart from dimensions, there are several other basic features that can make it easier for adults to move around in space. For instance, avoiding sharp edges furniture, avoiding high gloss finish, avoiding low height sitting, proper furniture arrangement can make a big difference in space. Due to reduced mobility, it would be a good design to have supports at every few steps for elderly to move around effectively in the space. Placing furniture in a way that can also become support for the elderly in addition to the basic functionality will make optimum use of space.

Each space in the house will have different furniture requirements. Also, each person has different interests and needs. It is important for a designer to design with every individual by involving them in the design process to achieve more personalized design.²⁵ In the case of the bedroom, most of the seniors face issues in getting on and off the bed. A safety rail which comes in various styles can be provided on the bed. This enables the adults to support themselves while getting down and also reduces the risk of an accident. In the case of a wardrobe, adjustable shelving systems and pull-down shelves allow easier access to elders. Also, a lever handle provides a better grip than a doorknob and therefore is easier to operate. In the kitchen, adjustable countertops are useful for everyone regardless of the difference in height or usage pattern of users. A motorized adjustable sink should be used which would facilitate the ease of use for each user based on their height. Also, the adjustable sink would leave empty space under the cabinet which would increase its utility for wheelchair users as well. The use of pull out shelves or drawers (instead of doors) can make lower cabinets more convenient for adults. Upper cabinets are easily accessible to adults using pull-down mechanism. A "D" shaped handle is the most comfortable shape to open or close any kind of furniture for elders. It provides a better grip as compared to knobs.²⁶

CONCLUSION

Interior designing of the built environment has a major influence on its inhabitants' lifestyle. This study shows how effective interior design strategies can make the aging process easier and happier. The design solutions for one effect of aging overlaps with other effects. Appropriate lighting in the space not only mobilizes navigation but also positively influences the mental health of the elderly. Even an ergonomically designed staircase for seniors promotes the independence of older adults. The right choices in flooring material can prevent the elderly from serious falls and promote safety. Furniture designed in collaboration with rehabilitation experts can lead to highly customized and effective solutions. Advanced and collaborative research needs to be done by interior designers to enhance the lifestyle for the elderly in residential spaces. A multidisciplinary approach should be used when designing for the elderly. As rehabilitation professionals have a huge client base of older adults,

their knowledge regarding aging effects can be utilized in interior spaces. Like industrial designers, interior designers should also collaborate with Gerontologists to develop more efficient home interior solutions for seniors.

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CHALLENGING REDUNDANCY IN INSTITUTIONS: AN ATTEMPT TO AMELIORATE STATIC LEARNING ENVIRONMENTS

Author: ANANYA SETHI, RAMADASS BAMA THIRUVENGADAM

Affiliation: SUSHANT SCHOOL OF ART AND ARCHITECTURE, INDIA

INTRODUCTION

"We shape our buildings, thereafter they shape us" Winston Churchill, 1943

Post this declaration, a few decades later, psychologists and neuroscientists were able to verify Churchill's claim, with ample evidence in support of the cause and effect between spaces we occupy, and our mood and wellbeing.¹ Despite the findings, architects and designers pay scant attention to the quality of spaces & potential cognitive effects of their creations on the users, which is especially true with the design of learning environments.

With the advent of the 21st century, digitalization & globalization, there has been a substantial shift in the pedagogical & educational landscape.² This however, has happened without a subsequent shift of the design of learning environments & its ability to support these pedagogical methods. In India, majority of the public schools are in a deplorable state & exist as mere containers for students.³ This research seeks to investigate a solution for these impediments to quality education. Based in a resource constrained setting in an urban village in New Delhi, India, the research explores reevaluating the premises on which institutional buildings are designed and built. It seeks to propose guidelines for better design of institutions as mixed-use community hubs and towards improved design of cognitive learning environments.

PUBLIC SCHOOL BUILDINGS: EVOLUTION & STAGNATION OF DESIGN

Education plays a fundamental role in the development of a nation, with its multiplying social and economic effects over generations. Public schools around the world carry the onus of educating the masses and seek to hone students with the necessary skills, experience and techniques for their future careers; some of which may not exist today.⁴

"School buildings are seldom expected to be more than buildings that just happen to be schools" - Building Educational Consultants India Ltd.⁵

The learning environments today were derived more than 150 years ago during the Industrial revolution to fabricate the adults they subsequently required to work in the factory life.⁶ The traditional 'Factory Model' or 'egg-crate' model of schools was setup as the prototype of school design which was an efficient tool for mass education. This system of education was analogous to mass production in factories - by introducing students as raw materials to a regimented school life, with an authoritarian module and teacher-led pedagogy, it was an excellent method of training students to do exactly as instructed, which sufficiently prepared them for their future jobs. ⁷ The classroom became a place where students received direct instruction from teachers placed in the front of the classroom, while students were seated in rows, often on bolted furniture which ensured strict rigidity. ⁸

However, decades on, not much has changed with the design of learning environments despite the dramatic shift work environments have witnessed - from an authoritarian regimented arrangement, to an environment where the 4C's of 21st century are of utmost importance: collaboration, communication, critical thinking, and creation.⁹ Schools have failed to acknowledge this transition of jobs & industries and have therefore stagnated without modernized pedagogical methods or environments. While Indian private sector education is making attempts to modernize their ways, public schools typically exist with bare-bones infrastructure merely fulfilling the area requirements necessary for the so-called school buildings. There is therefore an ineluctable need for upgradation of these institutes.



Figure 1. Factories and Schools in the 19th Century

IMPACT OF ARCHITECTURE OF SPACES ON PEDAGOGY

Built forms, though immobile and static, have the ability to guide, direct and communicate ideas that influence the way we use spaces, thereby affecting our behavior, activity & interaction & holistic development as individuals.¹⁰ The design of learning environments can translate and support the pedagogical methods undertaken in schools.¹¹ For instance, in an oblong rectangular classroom, the design favors a teacher-centered approach, where the teacher assumes the dominant figure in both space and pedagogy & students become the recipients of knowledge.¹² This fosters passive student learning whereas a student-centered layout would enable more active learning, with better peer learning and student-teacher relationships formed. Table 1 exhibits the feedback provided by students & faculty members between traditional & interactive classroom design.¹³



Figure 2. Impact of oblong classroom design

	Traditional Classroom (Desks in Rows)	Active Learning Classroom (Roundtable or Other Non- Traditional)	
Students	Instructor-centered Boring Isolating Oppressive Restrictive Intimidating	Student-centered Interactive Engaging Comfortable Open Relaxing	
Faculty	Instructor-centered Can be efficient, if arranged properly "Tombstones in a Row"	Student-centered Interactive Egalitarian Socratic Conducive to learning Useful for small group discussio	

Table 1. Student and faculty comparisons of traditional and active learning classroom ¹⁴

Though research available on the relationship between a student's academic outcomes & spatial settings is limited & requires further scholarly attention, studies prove that altering learning environments and pedagogies leads to students outperforming peers taught in traditional settings with a variation of 7-10% in scores. ¹⁵ Further, classroom participation & discussion increases considerably with the use of flexible seating arrangements.¹⁶

INDIAN PUBLIC SECTOR EDUCATION: FAILURES AND SHORTCOMINGS

India is home to the world's largest youth population with 600 million people under the age of 25. It is also home to the world's largest illiterate population at 37%.¹⁷ Of this, a mere 29% of children are privileged enough to afford private education, leaving a staggering 71% who would attend government run schools.¹⁸ Despite these schools catering to enormous numbers, the condition of public schools is abysmal.¹⁹ The difference between public and private sector education is amplified in third world countries such as India, leading to the fabrication of adults lacking basic employability skills even after 'attaining education'.

Broadly, public schools in the country are failing to perform adequately due to a wide gamut of reasons. A few of these are:

1. Teachers & redundant pedagogical methods:

Teachers as conductors assist in imparting knowledge & competence to students. They play a vital role in educating future generations. However, as a consequence of dearth of skilled faculty members and high teacher-pupil ratios, coupled with an outdated syllabus and focus on rote learning, the level of 'attained education' remains inadequate which subsequently leads to lower enrollment rates for higher education.²⁰

2. Drop-out rates & challenges towards education of girls:

For India's underprivileged, the patriarchal mindset still defines the majority. This poses as a grave challenge, especially towards the education of girls, which coupled with other difficulties such as long walking distances and unsafe streets, puberty and lack of toilets in schools, becomes a serious deterrent. These factors conjointly lead to lower enrollment and higher drop-out rates.²¹

3. Infrastructure and the built environment:

Despite large budgetary outlays made by the government of India, public schools are modelled to merely serve as containers for students due to apathy towards design of conducive learning environments. The present-day scenario of government schools was analyzed in depth on a multitude of factors.²² A few of these are summarized below:

3.1 Basic amenities & infrastructure -

Most schools lack basic necessities such as availability of drinking water, toilets on school premises and are often devoid of electricity.

3.2 Human comfort & functionality of design -

The school building design negates building orientation, with inadequate openings & windows, lack of ventilation & natural lighting. Further, spaces are not catered to the anthropometry of children. Students are often faced with furniture-less situations, forcing them to sit on floors.

3.3. Conducive Learning Environments -

Classrooms are the sole learning environments, with no provision for ancillary learning spaces such as libraries, workshops, science laboratories etc. There are no provisions for alternate learning pedagogies, with no recreational or spaces for hands-on learning.



Figure 3. Typical Conditions of Public schools in Delhi NCR

3.4. Site response & community inclusion –

The buildings fail to recognize the urban fabric, site context & surrounding communities as an imperative aspect of the design brief. As a result, the school building is designed to be only utilized during the 8 school hours and 220 working days in an academic year. ²³ The implication is a building that is only utilized for 20% of the hours in a year, indicative of a redundant school complex with wasted resources. ²⁴

Thus, having established the current scenario of public schools, coupled with the importance of the design of learning environments, there is a dire necessity for intervention & upgradation. As public buildings that exist within communities, these schools envelope the potential to serve larger user groups, if integrated within the community during its planning. Shared resources between the school and community can challenge the redundancy of the usage of the school building while also providing the students the required ancillary learning environments.

URBANIZATION IN INDIA: ITS IMPLICATIONS

India, with its impressive development trajectory, is headed towards becoming a global superpower.²⁵ Attributing to its rapid economic growth, demographic trends, its international social and political standing, the country is paving its way towards global dominance. The country is also expected to overtake China as the world's largest country by 2022.²⁶ This demographic increase could positively lead to economic growth if India manages to evolve & revive its education system, increase its educational attainment levels & provide skills to the youth.²⁷

This growth is however, not isolated from obstacles that come alongside the development. Flagged by urbanization, metropolitan cities are experiencing a tremendous exodus of population from rural to urban environs with consequences such as urban sprawl. New Delhi - one of the fastest-growing urban megapolis, is predicted to become the world's most populated city by 2028²⁸. It is also predicted that the world urban population will see a steep upsurge from 55% to 68% by 2050, with India accounting for 35% of this growth with more than 400 million urban dwellers.²⁹



Figure 4. Urban and Spatial growth of Delhi and its surroundings.

This magnitude of growth that the country is experiencing has led to an exacerbated rural-urban divide.³⁰ Organic and informal settlements have created complex urban centers that attract millions with its shiny image, only to breed poverty and poor living conditions that are found upon scratching the surface. Contrarily, slums, urban villages and unauthorized informal settlements act as the backbone for the informal and service sector. 'Urban village', for instance, is a paradoxical term that is inherently contradictory to its name and represents rural entities that are inhabited in the process of urbanization of a metropolis.³¹



These settlements, however, provide economic advantages such as inexpensive accommodation and land prices, but the living conditions are deplorable, coupled with inadequate social and physical infrastructure. As extremely dense settlements, there are no break-out spaces for the population residing there, resulting in a need for intervention and upgradation of these settlements.



Figure 6. An urban village in New Delhi & its aerial view

Further, in the Indian urban context, while there are a plethora of 'designed' public socio-cultural spaces, in the form of monuments, galleries, museums etc., these are largely deficient in capturing the larger public conscience. Gardens and parks exist in the form of leisurely public spaces but are reserved for a certain socio-economic stratum. Their design also isolates them from city in the way they are bound by boundary walls on all sides and are rendered inaccessible after certain hours of the day due to security concerns. All metropolitan cities in India lack inclusive urban spaces as they do not offer the economically weaker sections with public spaces where they can come together as a community. This further alienates them, thereby resulting in need for all-inclusive urban spaces. Thus this paper questions the lack of inclusive urban spaces as well as the dearth of multi-user, multifunctional urban facilities, that could potentially serve India's complex & unique urbanscapes.

IDEA ARGUMENT

This research paper is an attempt to tackle two fundamental obstacles that India is facing as it moves towards becoming a developed nation. First is the incompetence of public schools & government institutes as functional tools for imparting quality education, with an imperative focus on the design of learning environments. Second, is the complexity that an 'urban' village presents: in its paradoxical conditions, classified as an urban entity, yet exhibiting village-like traits of unplanned buildings, population explosion, lack of resources & infrastructure. These challenges together, provide the opportunity to create a prototype for an urban catalyst.

This paper explores a new building typology as an intervention in an urban village. As a mixed-use, multi-user institution in a resource constrained environment, this 21st century learning institute would become a bustling community hub with functions catering to different user groups and shared resources.

METHODOLOGY



Figure 7. Methodology

CASE STUDIES, ANALYSIS & OUTCOMES Case Study 1: Montessori School, Delft

A school designed by Herman Hertzberger on the principals of the Montessori School of Education, stands as a successful representative of an institution that is not built on the traditional norms of rectangular classrooms. Rather, Hertzberger challenged this philosophy, as the design of his buildings focused on the 'in between' spaces as much as they did on the primary functional zones – encouraging social interaction & activity everywhere.³³

As a school in alignment with the Montessori method of education, it sought to undertake:

• No fixed hierarchical relationships between the students and the teachers, rather providing for varied relationships to enable multiple forms of teaching and learning.

• Simultaneous activities undertaken by students in the form of individual, one-on-one or small group activities.



Figure 8. The School

To provide for this, Hertzberger designed the L-shaped classrooms with a level difference in an attempt to provide the students a space where multiple activity zones are created. These would enable diverse activities that could be carried out concurrently, without the causing hindrance to others that may require extra concentration with their work.



Figure 9. The L shaped classroom: in plan and section

These classrooms were placed along a 'learning street' in the form of a central hall, rather than a horizontal corridor. This became a flexible base for additional activities and peer learning, for individual and group activities.



Figure 10. Plan with the central 'learning street'

Mazaronkiari Multifunctional Classroom



Figure 11. The multifunctional classroom

Situated in the native community of Mazaronkiari, in the region of Peruvian central jungle, the Multifunctional Classroom emerged out of a need to provide for a community with a large population whose children do not have easy access to education. It was a project that initially started with the brief to create a school canteen for the kindergarten with 30 students. Upon the successful grant of funds, the school enrollment elevated to 120 students and the architects Marta Maccaglia and Paula Afonso were now faced with a new design brief, which had to cater to four times the number of students that they had initially planned for.³⁴

Maccaglia and Afonso then proposed a multipurpose space, one that would serve as a classroom, a cafeteria and kitchen, an auditorium & assembly space and a space for communal gatherings in the after-hours for the locals. This was achieved by building the structure with wood, and creating the side walls as moveable panels. With a 90° movement, the panels would turn into tables thus allowing the creation of diverse work environments & configurations within the same square footage. Thus, the

architects were able to not only deliver the promised dining space, but the multifunctional hall became a public square.



Figure 12. The multifunctional hall and its alternate uses (top), operable panels (bottom)

SITE SELECTION & ANALYSIS

To implement the prototype of a mixed-use, multi-user 21st century institution, the site was predetermined to be:

- situated in an urban village
- under grave developmental pressure, with lack of resources & facilities
- a diverse user group in order to facilitate the institution as a shared facility³⁵

The site subsequently chosen was in Lado Sarai, an urban village in South Delhi. As a resultant of population intensification in the past few decades, a previously marked residential zone has now transformed into a major mixed-use hub.³⁶ A disparate community was formed with users varying from migrants, tenants & land owners to designers, artists and architects, providing the urban village a distinct, cosmopolitan character. Since this growth was unplanned & unprecedented, the village was deficit of the required public & social facilities.



Figure 13. Aerial view of site and land use, built & open space analysis

The selected site lays on the periphery of the urban village which would not only permit it to serve the people of Lado Sarai, but enable interaction with other communities & villages. This intervention would thus serve both, the indigenous resident community & working class, while effectively reducing burden on the limited resources & thus improving the standard of living.



Figure 14. Street sections signifying the space constraint as one moves to the inner streets of Lado Sarai

CONCLUSION

The design of educational facilities and learning environments, though often not considered as pedagogical instruments, play a vital role in serving as '*teachers*' which can impede the educational process, if inadequately planned for. Entangled within the paradigm of factory model of schools, public schools of India are severely crippling the output of future generation of learners with the

apathy & indifference to the design of the learning space. The impending necessity for change, is tackled with an opportunity to resolve more than one impediment to development that the country currently faces.

Through the exploration of case studies such as the Montessori School that was envisaged way ahead of its time, it seeks to educate & inform how to break free from the Industrial-era school planning. Built in 1966, it was distinctly applauded for its uniqueness in design and approach to planning. The Mazaronkiari Multifunctional Classroom stands as a successful example for a small-scale multifunctional intervention that manages to fulfill the community's aspirations at different levels – from providing a learning environment to the students, to creating a communal hub. Its distinctive approach towards the design of one element, in the form of the moveable panels, manages to transform the space.

Thus, having investigated the challenges plaguing India, this research highlights the realization for change in public institutes & requirement for mixed-use, multifunctional facilities with shared resources in dense urban villages. An attempt is subsequently made to redefine the relationship that an institute holds within the community – by enabling shared resources & encouraging use by multiple user groups, while tailoring the learning environment for 21^{st} century pedagogies.





Figure 15. Current & Proposed Design of Schools

Proposed Guidelines for Design of Learning Environments

Traditional classroom design prohibits and restricts the nature of children and their natural tendency for movement. An attempt is made to move away from this. Based on the research, these are the potential solutions available to designers for 21^{st} century learning environments:

1. Cognitive Learning Stages

The classrooms for primary (grade 1-5), middle (grade 6-10) and secondary school (grade 11-12) must be customized to the students' ages, cognitive learning stages and anthropometry.

2. Form

Classrooms as oblong spaces do not provide equal flexibility or opportunities to the teacher and students to utilize the area in an effective manner. A centric space however, is better suited for this. Taking the learnings from the case studies into account, an L shaped form was adopted for the classrooms. The centric square is utilized as the primary learning environment, while the additional space is used for circulation in the form of the staircase that leads to the mezzanine floor.



Figure 16. Classroom Shapes: Centric vs Linear

3. Mezzanine Floors

In order to implement 21st century learning pedagogies that focuses on a student-centered approach rather than rote learning, classrooms need to be flexible enough to support ancillary functions that go beyond the teacher-led lectures. Mezzanine floors in all classrooms provide for that additional space in the same volume.

4. Circulation space as a supplementary learning zone

In order to facilitate multiple places for teaching and learning, the staircase leading to the mezzanine floor must not be considered as a device for circulation, rather should be treated as a supplementary learning space.

• For Primary classrooms, bigger landings are provided, connected with a slide complimenting the playfulness of the age. Installing chalkboards along these landings promotes & encourages children to explore and learn from one another.

• The staircases for the Middle school classrooms are planned to accommodate lectures for larger groups sitting on the staircase, or to encourage group work. It becomes a social setting in the class.

• Focusing on individual studies, the Secondary School classrooms allow for self learning with study niches formed on the landing.



Figure 17. Classroom configurations

5. Enabling Social Integration between different sections and grades

The current structure of Indian schools segregates students of the same grade within multiple sections which seemingly restricts social interaction amongst peer groups. An attempt is made to invigorate social relationships amongst students of different grades:

Primary School Classrooms

• By bringing together two L shaped classrooms, the central space becomes a common spill-out & a combined space for teaching and learning. It encourages social interaction at a more domestic scale, appropriated to the children's age.

• To encourage movement, the two classes seamlessly flow into one another once opened, and create a larger learning space to break free of restrictive learning spaces.

• The communal space opens outwards, and these classrooms are integrated with monitored outdoor spaces.

Middle School Classrooms

• The module of the L shaped classroom is inverted to allow social integration at a greater scale that goes beyond interaction between the other section of the same grade.

• The entrance to the classrooms becomes the space for social interaction, allowing for multiple activities.

Secondary School Classrooms

• To enable students selecting different streams with electives, classrooms are designed to be divisible to provide flexibility for two different spaces for electives, and a singular space when required.



Furniture-less Situations

Often faced with furniture-less situations, children are forced to sit on floors which becomes a hindrance to their learning capabilities. To tackle the same, the following solutions have been proposed, which can also be otherwise utilized to create a conducive learning environment.

Fold-out Ledges

Customized to the scale and anthropometry of the students, the concept of fold-out ledges focuses on the possibility of creating multiple learning environments. The ledge could be used as a worktop and study desk, seating and a backrest, or as a display or a storage shelf etc. As a multi-purpose element, it would enable the possibility of individual or group work, and in times when it isn't required, the classroom would be able to accommodate more space as this would stow into the niche created in the walls.



Lowered Teaching Space

If the school follows teacher-centred pedagogy, the use of chalkboards can create an uncomfortable learning environment for students sitting on the floor, specially those sitting right in front. To accommodate this, the chalkboard can be lowered, along with creating a level difference of one foot in the teaching space to suit the eye level of the students better.



Figure 20. Lowered Teaching Space

Corridors as Learning Streets

A doubly loaded corridor, in its traditional form in schools is stacked with rooms on both sides. However, borrowing from Hertzberger's design philosophy for 'in-between spaces', the corridor is not treated just as an instrument for circulation. It seeks to activate a 'learning street', wherein the corridor opens up to spaces of varied activities. By staggering classroom blocks on higher floors, visibility and interaction amongst different grades is accomplished, breaking up the rigidity of the doubly loaded corridor.



Figure 21. Concept of Social Corridors as proposed by Hermann Hertzberger (left), Proposed Corridor (right)



Figure 22. Implementation of Proposed Social Corridor

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EXPLORING THE INFLUENCE OF USER WELLNESS IN COMMERCIAL INTERIOR DESIGN

Author: AMY HUBER

Affiliation: FLORIDA STATE UNIVERSITY, USA

INTRODUCTION

Constructs of wellness are increasingly coming to the forefront of our consciousness-both in the design sector and in the broader societal landscape. However, we do not yet have a contemporary and empirically grounded understanding of its influence on the decisions of designers. This study employs survey results stemming from 184 interior designers practicing in a range of commercial market sectors (e.g., corporate workplace, health and wellness, and education). The goal was to compare the influence of user wellness against a range of potential project drivers. Additionally, priorities were compared amongst designers' perceptions of their clients' concerns versus their own. When asked about their clients' priorities, respondents indicated that user wellness was less important than budgetary restrictions and the integration of technology. However, wellness was considered more important than external perceptions of the organization and short-term return on investment. Amongst the designers, user wellness scored as the second most important factor, behind real estate efficiency. Wellness was deemed more important than factors such as accommodating regulatory changes, environmental stewardship, and technological integration. Free responses elaborated on these themes and revealed 150 domain-specific design strategies utilized by respondents to enhance user well-being within their designs.

BACKGROUND

Concepts of human wellness and wellbeing have long figured into the human lexis. Scholars dating back to Aristotle have cited its significance¹. While the World Health Organization (1948) formally introduced the concept of wellness in its founding documents². That said, for much of the 20th century, the field of psychology largely attended to the amelioration of psychopathology, thus overshadowing the promotion of wellbeing.³ More recently, lessons from positive psychology⁴ coupled with our growing knowledge of antecedents to and implications from human wellness seems to suggest these concepts are increasingly coming to the forefront of our consciousness—both in the design sector and in the broader societal landscape.⁵ For instance, design firms are increasingly leveraging wellness in their marketing literature. These efforts are bolstered by guidance from non-profit organizations and private companies. Moreover, the outcomes of these efforts can be verified by third-party certification systems developed within the last decade, such as fitwel[®] and WellTM. Collectively, these criteria call for an assessment of a building's location, its potential to positively impact its occupants and the surrounding community, while reducing negative issues such as morbidity and absenteeism.⁶ The goal

is to create equitable, resilient, and evidence-based design solutions,⁷ all centred on enhancing wellbeing.

Constructs of Wellbeing

There is no central canon defining human wellbeing; definitions include a variety of factors and areas of emphasis.⁸ Among the most comprehensive is the definition offered by the United States' Centers for Disease Control and Prevention.⁹ This agency's definition draws on research from diverse fields, citing factors of physical, economic, social, emotional (i.e., affective), and psychological (i.e., processing information) wellbeing. Their description also considers one's domain and life satisfaction, which may stem from their personal development, as well as their involvement in engaging activities and work. The CDC posits that wellbeing impacts self-perceptions of health and social connectedness, as well as one's longevity, productivity, engagement in healthy behaviours, and avoidance of mental and physical illness.

Hedonic and Eudaimonic Wellbeing

A central delineation among wellness definitions is that of hedonic and eudaimonic perspectives.^{10,11} The hedonic perspective prioritizes the pursuit of pleasure,¹² whereas eudaimonic wellbeing centers on one's living in accordance with their *daemon*, or true self.¹³ Eudiaomonic wellbeing posits that true happiness stems from the expression of virtue by doing that which is worth doing, and the self-realization resulting from these efforts. Waterman et al.'s, (2010) taxonomy of eudaimonic wellbeing considers factors of self-discovery, one's investment of significant and intensive efforts in the pursuit of excellence, the development of one's potential, their sense of purpose and meaning in life, and their enjoyment of activities that involve personal expression. Despite an ostensive focus on physical wellbeing, the tenets of fitwel[®] and WellTM seem to suggest these eudaimonic constructs may be enhanced by environmental features. That said, the degree to which clients fund and adopt those features likely depends on the perceptions of both clients and their designers, and the communication between the two.

Diffusion of Innovation

As more becomes known about design features that foster human wellbeing, the ability of designers to convey the benefits of such features seems warranted. Outside of design, the ways in which new ideas are spread and products are adopted has been a source of inquiry since the early 20th century.^{14, 15} Early adoption and diffusion studies either emphasized an individual's locus of decisionmaking or their degree of innovativeness.^{16, 17} Other diffusion studies probed the role of *change agents* and the importance of communication channels.^{18, 19} Among the most prominent figures in diffusion scholarship is communications scholar Everett Rogers, ^{20, 21, 22} who unearthed a series of themes embedded within early diffusion research.

Collectively, these constructs shaped the diffusion of innovations theory, which posits that the distribution and dissemination of innovation is a social and dynamic process. Rogers' last book prior to his passing suggested that this process involves: 1) an innovation, 2) an individual who has knowledge or experience using the innovation (i.e., an opinion leader, change agent or early adopter), 3) another individual that does not yet have knowledge or experience with that innovation (i.e., potential adopter), and 4) the communication channel connecting the two individuals.²³

In the context of design, parallels emerge between clients and potential adopters. Change agents are described as professional innovation advocates, who, given their training, are often considered apart

from and different to potential adopters. Given this characterization, the roles and responsibilities of designers align with those of change agents. When drawing parallels between Rogers' work and the archetypal roles of designers, one could assume more successful adoption outcomes when designers are viewed as authentic, credible, and empathetic by their clients. Additionally, Rogers' work suggests that successful change agents frequently engage with their clients, act from a client orientation, and operationalize opinion leaders from within the client's organization to persuade others.²⁴

Summary

Collectively, the literature suggests mounting interest in the potential of design to contribute to human wellness. At the same time, however, the literature lacks a current understanding of the perceptions of corporate clients and designers. More specifically, more knowledge is necessary to understand areas of alignment and aberration among priorities of user wellness and other factors potentially driving design decisions in commercial projects (i.e., financial, real estate efficiency, diversity, regulatory, environmental, external perceptions, and technological).

RESEARCH METHODS

This exploratory study stemmed from a post-positivist perspective.²⁵ Its methods involved the use of a cross-sectional survey designed to ascertain the perceptions of commercial designers.

Instrument Development

The study utilized a Qualtrics[©]-based, online questionnaire for data collection. The survey consisted of three parts:

- 1. Quantitative assessment of client and designer priorities,
- 2. Free responses to elicit information elaboration of themes and wellness features, and
- 3. Demographic information

To minimize attrition and participant fatigue, respondents only answered those questions appropriate to their discipline; consequently, not all participants answered all items.

Content and construct validity was considered by using the literature to inform answer options, and providing explanatory labels and a free-response option for elaboration. Internal consistency was sought by retesting themes with multiple items, and testing reliability with Cronbach's alpha.²⁶

Sampling

The PI utilized purposive sampling by eliciting the informed perceptions of commercial interior designers practicing within the United States. A recruitment list was generated through a tiered process. First, Interior Design Magazine's 2019 100 Giants inventory provided an index of large firms. To include designers in small- and medium-sized firms, the PI reviewed business journals from 12 cities and visited the websites of regional chapters of AAHID (American Institute of Healthcare Designers), ASID (American Society of Interior Designers), IIDA (the Commercial Interior Design Association), and NEWH (The Hospitality Industry Network). To delimit the target population to those involved with interior design projects, the PI visited the firms' online staff directories and used Linkedin© to locate the names of those with titles such as *senior designer*, *principal*, or *interior designer*. These efforts culminated in a total of 2,061 designers who received an invitation to the survey via email.

Data Analysis

Interval-level data were analysed in SPSSTM using descriptives and crosstabs with Tukey's post hoc testing for statistical significance. Free responses were analyzed line-by-line in NVivo12. This process was followed by open-coding, wherein data was broken into parts. These parts were then analyzed for emerging themes and meaning units.²⁷

Participant Characteristics

A total of 164 individuals responded to the survey (i.e., 8% response rate). Eighty-percent of respondents stemmed from market sectors of either workplace (36.4%), health, wellness & senior living (29.3%), or educational environments (14.7%). Too few respondents reported from entertainment, civic, retail and hospitality, and transportation market sectors to warrant statistical comparison. Nearly half of the participants (48%) held senior-level positions within their firms. Similarly, over half of the participants (56%) had more than ten years of experience. Forty-two percent of respondents worked in large firms. Additionally, participants held a range of accreditations and certifications and were involved in a variety of professional organizations.

FINDINGS

Designers' Perceptions of their Client's Priorities

To understand the perceived significance of wellness as compared to other potential design drivers, designers were asked to rate the importance of these considerations to their clients on a 4-point, Likert-type scale. As indicated in Figure 1, of the eight themes queried, user wellness scored as the third most important (M=3.49; 1 not important; 4 important), behind factors of budget restrictions (M=3.60), and technology integration (M=3.59). Conversely, environmental stewardship scored as least important (M=2.71). Post hoc testing revealed no significant differences in the scores among market sectors.



Figure 1. Designers' perceptions of their client's priorities, n=164

Free responses highlighted competing priorities. Such that, some respondents emphasized their clients' focus on the bottom line. For instance, one participant noted that they are,

"Always struggling with budgets on almost every project. Contractors are being brought on earlier in the project and cause complications/hurdles in which they decide something isn't going to fit within the client budget before we're ever able to actually design a space [sic]. It's a constant conversation from beginning to end."

Still, others expressed the significance their clients placed on external perceptions of the organization, its users' wellbeing, of the dynamic nature of technology.

Designer's Overall Project Priorities

The project priorities of designers were somewhat differently framed than those posed about client priorities. For instance, it was assumed designers would be more aware of regulatory issues and the implications of inclusive design (i.e., diversity) and real estate efficiency (see Figure 2). Despite these differences, designers similarly prioritized issues surrounding user wellness (M=3.60), though placed less emphasis on the integration of technology (M=3.29) than their clients.



^{*}ROI indicates return on investment



Priorities Amongst Designers of Educational Spaces

Among the factors that influenced designers of educational spaces, concepts dealing with wellbeing (M=3.58) (directly or indirectly) scored as more important than all categories except for real estate efficiency (M=3.71) (see Figure 3). It should be noted; however, that wellbeing included constructs of safety. In fact, the single highest scoring item was ensuring safety (M=3.88), which was followed by creating adaptable, resilient classrooms (M=3.84), and integrating technology (M=3.76). Conversely, the two lowest-scoring factors were achieving certifications such as LEED or WELL (M=2.96) and minimizing employee turnover (M = 2.88).



Figure 3. Project priorities according to educational designers

In summarizing their priorities, designers elaborated on several of the themes. According to one,

"Design needs to support and provide opportunities for the students, staff and community to shine. If we were to purpose aesthetic decision with too much, "style," (color, pattern, distinct identity, etc.) we can [sic] deter and distract from the primary essential focus: the end user."

Real estate drivers centered on *future-proofing spaces* through flexibility. Some described the competing priorities of real estate efficiency and satisfying student needs. Wellness themes largely emphasized student engagement. Several respondents noted the dynamic regulatory environment, largely in response to increasing security needs. For instance, one designer suggested that *"With all of the school shootings, security has been an important changing factor in the design of the schools we build."* Several designers emphasized diversity, suggested that design solutions could foster more equitable education, in the words of one designer, *"inclusivity is imperative."*

Priorities amongst Designers of Health and Wellness Environments

As indicated in Figure 4, designers of health and wellness environments deemed the wellbeing category as most important (M = 3.68). In fact, the three highest-scoring single items belonged to the wellness category, accommodating patient needs (M = 3.98), followed by patient wellbeing (M=3.92), and ensuring safety (M = 3.90). The wellbeing category was followed by external perceptions (M = 3.65), and accommodating diversity (M=3.59). Among the categories scoring as least important were environmental (M = 3.03) and regulatory (M= 3.03). Accordingly, the single lowest scoring items were achieving certifications such as LEED or WELL (M= 2.54) and leveraging 'smart' building features (M=2.84).



Figure 4. Project priorities according to designers of health and wellness environments

The healthcare design participants offered the most elaboration. Several cited the essential nature of patient wellbeing in healthcare spaces. When prompted to explain wellness priorities, several mentioned the tie between patient wellbeing and an institution's funding, since HCAHPS (Hospital Consumer Assessment of Healthcare Providers and Systems) scores emphasize public reporting and accountability. Others noted how patient wellbeing factors into an increasingly competitive market, playing a pivotal role in whether or not a patient visits that facility.

Many respondents seemingly emphasized patient well-being over that of staff, which aligns with the scoring of survey items. In terms of staff well-being, designers indicated the role of wellbeing in staff recruitment and retention, especially given a shortage of healthcare professionals. Still, others associated staff wellbeing to that of patients.' For instance, one participant indicated that *"the ideal patient experience is borne from the ideal staff experience."* Others noted how more efficient and effective spaces can prompt better bedside care, while areas of respite can reduce fatigue and enhance the mental focus of staff.

Priorities of Designers of Corporate Workplaces

Corporate workplace designers scored real estate drivers as the most important category (M=3.68), which was followed by wellbeing (M=3.51), and external perceptions (M=3.51). The single highest scoring item was creating adaptable and resilient spaces (M=3.83), followed by maximizing employee recruitment and retention (M=3.82), and enhancing employee engagement (M=3.73). The lowest-scoring category was regulatory (M=2.54), while the single lowest-scoring item was achieving certifications such as WELL or LEED (M=2.53).



Figure 5. Project priorities according to workplace designers

In free responses, workplace designers suggested that while wellness is increasingly important, the degree to which it is emphasized and incorporated into a project largely depends on their clients' goals. That said, several respondents recognized wellbeing as an antecedent to employee happiness. Responses also highlighted the tension between the financial concerns of executives and the desires of their employees. Other matters involved creating equitable and flexible spaces that balance the diverse and evolving needs of employees.

Comparing Priorities

Collectively, the responses suggested potential discrepancies between the most prominent project drivers for clients versus those of their designers (see Table 1). For one, clients seemed to be most swayed by financial /budget concerns and the integration of technology, neither of which were rated among the three most prominent concerns by the designers. At the same time, designers were more apt to consider wellbeing -- each market sector cohort rating it as either the most or second most influential project driver. That said, regulatory and environmental factors were consistently among the lowest priorities.

		Education	Ugalth & Wallpage	Workplace
		Education	nearth & wenness	workprace
	Clients	Designers	Designers	Designers
Highest scoring	Financial (M=3.60)	Real Estate	Wellbeing (M=3.68)	Real Estate (M=3.68)
		(M=3.71)		
2nd highest scoring	Technology (M=3.59)	Wellbeing (M=3.58)	External Perceptions	Wellbeing (M=3.51)
			(M=3.65)	
3rd highest scoring	Wellness (M=3.49)	Diversity (M=3.57)	Diversity (M=3.59)	External Perceptions
				(M=3.51)
Lowest Scoring	Environmental	Regulatory (M=3.06)	Environmental	Regulatory (M=2.54)
	Stewardship (M=2.71)		Stewardship (M=3.03)	

Table 1. Comparing Priorities

Wellbeing Features

Designers were then asked to offer concerns, considerations, and design features aimed at enhancing wellbeing. Their free-responses resulted in 493 discrete units, from which 16 themes emerged (see Table 2).

Theme 1-Access to Nature				
• Visual or physical connectivity to the exterior or natural elements				
Theme 2-Active Design				
• Spaces or features aimed at encouraging activity and movement				
Theme 3-Ambient Conditions				
• Conditions of the surrounding environment such as temperature or humidity				
Theme 4-Amenities				
• Spaces and features that move beyond the basic program				
Theme 5-Atmospherics				
• Sights, sounds, or scents that contribute to the ambiance of the environment (Kopec, 2012).				
Theme 6-Behavioral Cues				
• Elements that serve as a signal to prompt a behaviour				
Theme 7-Design Ethos/Process				
• Priorities, beliefs, aspirations of the design, or strategies of the design team				
Theme 8-Finishes/Materials				
Interior Surfaces				
Theme 9-Furniture				
• Moveable equipment such as seating, tables, workstations, etc.				
Theme 10-Lighting (Artificial)				
• Fixtures or conditions involving the lighting of an environment				
Theme 11-Logistical				
• Decisions made to support workflows, tasks, operations				
Theme 12-Planning Strategies				
• Decisions made about spatial arrangements such as hierarchies & adjacencies				
Theme 13-Safety				
 Elements or decisions aimed at maintaining or enhancing user safety 				
Theme 14-Sustainability				
• Elements or decisions aimed at environmental stewardship				
Theme 15-Technology				
Elements or decisions aimed at integrating technology				
Theme 16-Wayfinding				
• Elements or decisions aimed at helping users navigate space				
Table 2. Emerging themes surrounding wellbeing features				

These themes were quantified according to market sector. Subthemes from these free responses are outlined below.

Educational Wellness Amenities

Amenities, access to nature, and planning strategies were most frequently cited by designers of educational spaces. The amenities listed could be classified as either shared, staff-centred, or student-centred. Among the shared amenities, one participant described the role of focal point amenities as a register for "the heart of the school, which is critical to student culture/success and can be used by staff and the surrounding community." Another noted the importance of a "center, town hall, or commons that is flexible but also unique and meaningful."
Access to nature included visible daylight, the inclusion of outdoor spaces and classrooms, operable windows, and views to the outdoors. Planning strategies focused on the provision of multivalent spaces that accommodate varying pedagogies, as well as balancing formal and informal spaces (see Table 3).

Amenities (20)		
Shared Amenities		
Focal Points		
Spaces to collaborate and concentrate (3)		
Wellness facilities/respite (2)		
Staff-Centred Amenities		
Break room, separate from administration (2)		
Lactation rooms		
Smaller private offices		
Work environments that support wellbeing		
• Student-Centred Amenities		
Amenity spaces such as huddle spaces		
Increased psych. services		
Innovation Spaces (2)		
Lounge areas (2)		
Sensory spaces		
Teaching areas in breakout spaces (2)		
Access to Nature (15)		
• Daylight/natural light (9)		
• Outdoor spaces/classrooms (4)		
Operable Windows		
• Views to the outdoors		
Planning Strategies (13)		
• Providing Multivalent spaces to accommodate varying pedagogies (6)		
Balancing formal and informal spaces		
• Providing Diverse/Variety of spaces (3)		
• Eliminating hallways		
• Including a center, town hall, or commons		
• Maximizing Sightlines		

Table 3. Wellness features cited by designers of educational environments

Healthcare Wellness Features

Among the features most frequently cited by designers of health and wellness spaces was access to nature. According to one participant, "Access to daylight and views is one of the most important elements of well-being in healthcare." Other prominent themes surrounded amenities, which could be categorized by their characteristics, types, and user groups. Health and wellness designers more frequently cited the importance of finish and surface materials (see Table 4).

- Access to Nature (50)
- Biophilia (5)
- Controlled daylight
- Exterior views for staff (2)
- Natural light/ daylight (20)
- Nature views (12)
- Outdoor gardens and spaces (2)

• Ou	utdoor walking paths (2)	
• Ph	nysical access to nature (5)	
• La	arge windows in patient rooms	
Amenities	(31)	
Amenity Ch	haracteristics	
• An	menities unique to the organization	
• Co	onvenient amenities	
• Ch	hoice of spaces that are away from bedside	
Amenity Types		
• Ar	reas of respite/restoration (7)	
• Co	offee/amenities in waiting rooms	
• Qu	uality retail more than a gift shops, pharmacies, & banking	
• Re	estaurant quality food and experience spaces - not just a cafeteria	
• Ur	rban Zen therapy	
• Wa	/alk-in massage	
Amenity by	y User Type	
• Fa	amily/Caregiver	
Ample space for family members to allow family to aid in the caregiving (2)		
Creating family space and amenities not only within the companion area comfort		
patient rooms but on the patient floors		
• Sta	aff	
Teaming areas for staff to share patient information (2)		
Break rooms design enhanced with better finishes/artwork		
Lounge areas		
Spaces for focus work as well as collaboration		
Areas of staff respite for quick breaks (3)		
Decentralized stall areas such as supply work (2) Technology centres for video conferencing		
Patient		
• I a Private space	res(2)	
Finishes/Materials (10)		
Aesthetics (6)		
Calming	concues (0)	
Home-like finishes		
Hospitality-like finishes		
Cues from nature to promote healing (2)		
Non-institutional materials and artwork		
• Performance/Sanitation (8)		
Durability (2)		
Withstand alcohol wipes and ultraviolet cleaning,		
Smooth, cleanable materials (4)		
High performance finishes		
• Flooring (5)		
Antibacterial (1)		
Flooring that reduces fatigue (2)		
Flip resistant flooring (2)		

Table 4. Wellness features cited by health and wellness designers

Workplace Design Wellness Features

Amenities were the most frequently cited wellness feature among workplace designers. Designers offered a cadre of such spaces, which could be characterized as serving either the collective or the individual. Break areas and cafes figured prominently into the perceived associations between wellness and amenity spaces (see Table 5). For instance, one respondent described them as a *"large,*

well-designed central pantry space to encourage employees to take breaks away from their desk and engage with their co-workers." Others noted areas of respite and focus. Additionally, these designers frequently cited behavioral cues aimed at fostering wellbeing and active design features, such as dynamic workstations and feature stairs.

Amenities (92)		
Collective Spaces/Amenities		
Access to healthier food choices (9)/filtered water (4)		
Activity spaces		
Areas to collaborate (2)		
Areas to foster healthy workplace practices		
Bike parking and tune-up		
Break spaces entertainment gaming lounges		
Centralized support spaces		
Common space with flexible use (3)		
Conference centres		
Educational spaces		
Facilities for showering after workouts (2)		
*Enhanced break areas (11)		
Fitness Areas (12)		
Hospitality and lounge-like spaces		
Micromarkets		
Multiple types of meeting spaces		
Social gathering spaces & community gathering (5)		
Spaces that contribute to WELL Building certification criteria		
Spaces for Yoga		
• Individual Areas		
Areas of respite (3), nap quiet space (1)		
Focus rooms Meditation (2)		
Meditation (2) Mothers rooms/lactation (5)		
Phone rooms (2)		
Restful & healthful private spaces/heads down (6)		
Wellness rooms (10)		
*Finhanced break areas were characterized as either generous cafes hub-like breakrooms snack areas or full kitchens		
which offer areas to store and prepare food while encouraging employees to take breaks away from their desks and engage		
with their co-workers.		
Access to Nature (48)		
• Biophillic design features (5)		
• Davlight/natural light (30)		
• Exterior views (8)		
• Outdoor Spaces (3)		
• Planting (2)		
Behavioural Cues (16)		
• Offering Variety choice control (3)		
Workspace flevibility/choice (11)		
• Workspace nextonity/choice (11)		
HVAC control (2)		
• Encouraging, activity walking/movement throughout the day (5)		
• Feature/visible staircases (5)		
• Dynamic workstations (6)		

Table 5. Wellness features cited by designers of corporate workplaces

FUTURE RESEARCH & DISCUSSION

Several limitations and global factors may bear influence on the interpretation of this study's findings. For one, data was collected prior to the COVID19 pandemic, given the dire health ramifications of this global crisis, outlooks on environmental factors and wellbeing may be rapidly evolving in unprecedented ways. As such, follow-up studies seem warranted. Moreover, future research could utilize additional means of data collection and better pinpoint wellbeing priorities by sampling clients and building developers directly.

Despite the need for more research, this study's findings suggest that wellbeing may be a priority that transcends market sector. That said, while clients are seemingly motivated to foster user wellbeing, these factors may be overshadowed by budgetary and technological concerns. As such, wellbeing features may need to be conveyed in a manner that is outwardly compatible with the organization's needs.²⁸ This research suggests that this means may stem from the lens of financial motivations. Such that, designers should highlight the long-term financial benefits stemming from enhanced user wellness.

Another theme emerging from the data arises from the wellness considerations and features offered by designers. Findings suggest that designers most frequently encourage wellbeing by one of two means; access to nature and a cadre of amenities. When comparing these features to eudaimonic wellbeing constructs, some associations become apparent. For instance, focus spaces could foster intense task involvement. That said, there seems to be room for improvement, such that designers might consider features that acknowledge one's desire for self-discovery, purpose, and personal fulfillment. For instance, environmental graphics could incorporate explicit and implicit messaging that supports a user's pursuit of excellence or their organization's common purpose. Moreover, designs could include infrastructure allowing for personal expression, such as student or staff galleries, or pinup spaces on the doors in senior living facilities.

Given recent world events, it is likely that our collective quest for wellbeing will evolve, but endure, and designers can play a significant role in such efforts.

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THE ROLE OF PSYCHOLOGICAL FLEXIBILITY IN THE THERAPEUTIC ENVIRONMENT. THE CASE OF THE MAGGIE'S CENTRE

Author: CATERINA FRISONE

Affiliation: OXFORD BROOKES UNIVERSITY, UK

INTRODUCTION

Increasingly, evidence shows that design can influence human experience and behaviour. Within healthcare, the non-clinical Maggie's Cancer Care Centre, which provides practical and psychological support in UK and elsewhere, is a case-study, as its demand for sophisticated architectural design has proven to be a key component of the project's success. While literature debates whether or not architects have enough knowledge of healing architecture in delivering their unique solutions, Maggie's CEO disregards the fact that when she commissions an architect, she asks to design a 'therapeutic environment' because it would be assumptive to think that the organization could 'heal' cancer-patients. Nevertheless, the feelings of encouragement and agency that cancer-patients experience so to find ways to tolerate what was intolerable before, are the expression of an effective healing condition of the building: the psychological impact generated from the bespoke architecture in synergy with people's presence enables a flexible state of mind in its users to ultimately constitute a therapeutic environment.

As part of the broader search for the "link" between Architecture and Psychological Flexibility, this paper explores the contradiction that appears enigmatic, despite discovering that simply by "not putting assumptions on how the person coming into the door must feel" and not labeling the organisation as such, Maggie's buildings, which offers normality, freedom, flexibility and a hybrid nature will be perceived as therapeutic environments.

The Maggie's Centre

The Maggie's Centre was co-founded in 1995, by Maggie Keswick and Charles Jencks, writers and designers, after a long battle with Maggie's breast cancer, as a reaction to the institutional deficiencies of the NHS in placing cancer patients in dark basements with plastic chairs and neon lights¹. The idea started modestly in 1994, when Maggie and Charles thought of converting a room at the end of a hospital corridor in Edinburgh into a small haven for cancer patients "with a view onto nature, where one could sit peacefully between treatments".² In order to instruct the architect to design her centre, Maggie wrote the Architectural Brief³ that, unlike any other building program, describes emotions and non-technical requirements. A fundamental request of the programme is the sophisticated and friendly architecture and in order to include all her possible ideas, the building takes a hybrid nature. "Each

centre is like a house that is not a home, an existentialist church that is not denominational, a hospital that is a non-institution, and a place of art that is a non-museum".⁴ A hybrid building is not a multifunctional building; it is a flexible building with a multiple reading and informal mixed continuity, opposite to sense of division and isolation, open to infinite interpretations for the person to come in.

Architects - Knowledge of healing architecture

After that Richard Murphy completed the first Maggie's Centre in 1996, other well-known designers were called to interpret the Architectural Brief. In 2003, Frank Gehry's name and fame opened the door to charity and received a lot of media publicity. Although, the organisation did not aim to commission celebrity architects, it turned out that by calling famous architects to collaborate the architectural quality was more effective in affecting people's wellbeing and, for the charity, in receiving more attention⁵. Thanks to the freedom granted by Architectural Brief, architects are free to customise their design based on the site, budget or whatever idea they have, so the buildings all look very different from each other, but identical in their final support goal.

Although literature refers to them as healing architecture, during interviews with 12 of the 20 Maggie's Architects, which aimed to find out how and to what extent the architects applied the Architectural Brief in their design, none of them claimed to have scientific knowledge of healing environments. "I struggle with the idea of scientific evidence. If we had waited for scientific knowledge, nothing would have happened" (Interview with Page & Park, Glasgow, October 1, 2018).

Maggie's Client and Programme

During the interviews with the Client-experts, CEO Laura Lee and Marcia Blakenham said: "We never say to the architect "we want you to create a healing environment" at all, because that would be awful and assumptive that "you need to be healed" and "we are going to heal you in this environment". However, they ask the architect to create "feelings" and this is only possible if they leave professionals free to think for themselves. "Because we are not trying to theorize and putting assumptions on how the person coming into the door must feel, it means there is freedom in our Brief and how we work with the architect to allow for the person to find their own way; in a way, it is like our programme gives support, it's about the best way for them, because everybody has different set of stuff going on. For some people seeing sky might be too overwhelming or too much sky" (Interview with Lee & Blakenham, London, May 14, 2019).

PSYCHOLOGICAL FLEXIBILITY

"Psychological flexibility is contacting the present moment fully as a conscious, historical human being, and based on what the situation affords changing or persisting in behaviour in the service of chosen values".⁶ As defined by Steve Hayes, one of the fathers of the ACT, Acceptance and Commitment Therapy, Psychological Flexibility is a key evidence based psychological concept that encourages a person to open towards uninvited changes to whatever degree possible and live a meaningful life even if in dire circumstances. Within the Maggies' Centre, it is embodied in Maggie's Kewick Jencks' motto: "Above all what matters is not to lose the joy of living in the fear of dying".⁷



Fig. 1. The hexaflex model of Psychological Flexibility

Greeks

To understand the origins of Psychological Flexibility in defining a therapeutic environment, we must refer to ancient Greece and the beginning of western healthcare. The therapeutic term comes from ancient Greek $\theta\epsilon\rho\alpha\pi\epsilon\nu\tau\kappa\delta\varsigma$ (therapeutikós), ("helpful, curative"). For over eight centuries, the ancient Greeks offered health care, combining compassionate therapeutic cures in places of great natural beauty, rich in vegetation and spectacular views. The ancient Greek town of Epidaurus is an example of holistic health care. At its heart, the Sanctuary of Asklepius, next to a gymnasium, stadium, the communal baths and surrounding nature; having the opportunity to go to the library, theatre or thermae, patients received care by professional carers in wonderful settings. As Michael Kearney reminds us in his book "A place of healing"⁸: "The healing temples of the Greek Asclepius creates a 'vibrant dance', a fluid synergy between patient and carers using the 'inner senses' of emotion, instinct, intuition and somatic awareness". In it the synergy between patients and caregivers who play a 'fluid dance', a slow movement embodied psychological flexibility.

Synergy between People and Place

The concept of 'synergy between people and place' is inherent in the notion of dwelling in a place where the cooperation or active co-presence of human beings with/within a protected artifact or architecture reach the generally unallocated axiom 'the creation of a whole that is greater than the simple sum of its parts'.⁹ In her TedxDundee Talk (2016),¹⁰ Lesley Howells talks about the "Synergy between people and place", explaining how Maggie's bespoke buildings work in synergy with the people to help build and tune resilience and psychological flexibility in the 'face' of cancer. By creating a 'fusion' between people and the surrounding spatial field, synergy allows people to be simply present and open to reality. This means that people open themselves to the concept of not fighting, finding freedom in the choice that is offered to us.

The investigation into the positive synergy between people and places in the context of the Maggie's Centre derives from the socio-philosophical discipline of Phenomenology, founded by Edmund

Husserl (1859-1938), developed by Maurice Merleau-Ponty with his "Phenomenology of Perception" (1965). Within the phenomenological space – which has the sensorial experience at its centre – the encounter between reality and subject is always a relationship of correlations. Therefore, phenomenology, in its methodological principles, is an investigation of correlation; in this sense phenomenology has been an appropriate methodology to be adopted in the Maggie's Centre which deliberately tries to create a strong mixture of correlations by placing cancer-patients in beautifully bespoke social contexts, to stimulate synergy between people and places.

THE ENIGMA OF THE OBVIOUS

One of the characteristics of Maggie's (after dropping 'Cancer Care', the organisation has also dropped 'Centre' from the name) is the total lack of signs and written words to remind visitors that the centre is like a home, where they would not hang signs on their doors. Another example is in communication. For instance, one of the brochures that advertise the Maggie's Centre, very uninformative, only says: 'Just come in'. In fact, only by entering the centre it is possible to receive information, only verbally, directly from the Staff. In addition to giving people the opportunity to freely place themselves in the world of Maggie's, just doing the opposite of the obvious, this strategical lack of written words invites people inside, where the exceptional architecture, unlike the hospital, opens up to people in the two consecutive moments of 'surprise' and 'love-at-first-sight'.

Freedom

When they walk through the door, visitors seem frightened, often in shock and they take a moment to take a breath. They could cry and say: "I don't know why I'm doing it". While receiving permission from the Staff to be emotional, recognising what matters to them, visitors will accept their illness and appreciate having the freedom to choose to react and empower themselves.

From the moment they enter the building, simply sitting and looking at the space, while having a cup of tea, will help visitors to be more responsive and better willing to meet the psychologist. After the 'Acceptance', the second step of Psychological Flexibility is the 'Defusion' which is the opposite of the fusion, therefore visitors will 'diffuse' from their thoughts. Does the building help with this? "Yes, it does. And I think it allows people to be with others and be with themselves and their problems and stay with them in a place where they're safe" (Semi-structured interview with Maggie's London Barts Psychologist, 13.12.2019). For all the visitors, the Maggie's Centre is a "safe place" and they described it as a "sanctuary", a "cocoon", or a "hugging comforting space". This concept of safe space, a space that allows visitors to work accordingly to their priorities on their own timeframe, is left to the individual: from sitting in a corner without talking to anyone but just being in the space, to the being in a peer support group talking about a particular type of cancer or a need.

Within 'Self-as-context', the third step of Psychological Flexibility, a sense of control begins to arise in visitors, no longer as a permission but with the freedom of 'do-it-yourself'. The easiest place to talk to other people is near the kitchen counter where they are encouraged to make their own drinks and meet other people through a 'pass me the milk'. In order to make that change possible and feel free, the building supports the visitor enabling a sense of identity around the kitchen table where visitors can recognise a familiar environment and sense of wellbeing.

Normality

When they go to the hospital, people become patients taking on the persona of a patient and behave in a particular way. In addition, very often the family sees the cancer patient as someone no longer

'normal', given the new vulnerable condition. When they enter the Maggie's Centre, visitors stop acting like patients and suddenly become themselves again, and the Staff say they can notice the difference. The Staff remind visitors who they are, just as the building reminds them who they are. 'Being yourself' helps to open up to others and, in the sharing process, a chain of reactions allows visitors to imitate others. Being exposed to normality, in a normal environment with normal people, behaving normally around people help cancer patients feel normal again. This daily "normalisation" practice is evident in several aspects of Maggie's programme, from offering to participate in physical activities, to sharing stories and emotions at the kitchen table or sitting quietly with a book, just like at home. It must be said that physical activities such as Yoga, Tai-Chi or Gentle Move can be quite difficult for some people; that's why teachers always recommend not doing some exercises if they have undergone a recent operation. By participating in activities, cancer patients often take courses as a way to feel normal and sometimes even challenge themselves knowing, however, that they are in a safe environment. This realisation involves a lot of work by the visitor; in addition to the clinical part, the psychological reconstruction process will focus, in the next three steps of Psychological Flexibility, "Contact with the present moment", "Values" and "Committed action", to be here, orientate around one's own values and open to new perspectives.

Flexibility

As many visitors describe it, it is the "Aura" that stimulates the senses of the body and generates wellbeing. In addition to the architectural space, Maggie's scenography (made of bright colours, soft chairs, good smells - so different from those of the hospital) and choreography (made of slow movements of people who walk quietly and speak calmly) contribute to creating a temporary performative reality, unique to the Maggie's Centre. In fact, to satisfy all the programme activities and the different courses, during the day the Staff continuously move the furniture and the rooms change their settings to become a new space, every time. In the search of Psychological Flexibility among Maggie's visitors, I realised that by offering flexibility and versatility, Maggie's buildings help people adapt easily, therefore, to become flexible. The building has no secrets, and nothing happens behind the doors. That's why at the Maggie's Centre we find large doors that roll and don't close or slide and don't close, or even curtains that people rarely pull. So, thanks to the building and the way it was designed, many different confiding conversations can occur comfortably in the same room and people feel comfortable that what they said will stay with Maggie's, and visitors will not share it outside. This is Maggie's flexibility: the building relaxes visitors to open up and share experiences and emotions, without worrying that confidential information is disclosed. There is trust in the community: visitors trust the building, and trust people. "Yes. There's an inherent kindness I think that runs through its core. A kind of school, you, for yourself and for others, I mean it's really powerful. And very contagious, yeah" (Focus group Barts, 2019).

The power of the hybrid, the fourth ingredient

In this paper, I talked about the freedom, normality, flexibility that Maggie's scenography offers daily to its users. Within this continuous change of backdrops, in the search of Psychological Flexibility, the hybrid nature of the Maggie's Centre reveals. As a 'non-type' but repetitive building; original but with common elements; coherent but structurally diversified, as mentioned, Maggie's is like a house but not a home, it's a collective hospital but not an institution, a church but not a religious place, an art gallery but not a museum. This mixture of functions makes them more effective in reflecting on the users: the large kitchen table informally invites users (staff, doctors, cancer-patients, family,

friends) to start a conversation and share their experiences, creating a community atmosphere, a feeling that brings everyone together to tell them they are not alone and not the only ones. As in ancient Greece, patients and carers work in synergy, side by side, to establish safety and trust.

The other rooms that carry out the tasks of the hybrid (hospital, church and museum) are the spaces where people want to be on their own. Perhaps resting, laying down or crying, they find privacy in separate corners that maybe overlook a small courtyard with a tree or looking at the others without necessarily joining in, since at Maggie's, visitors perceive the building as social and private at the same time. Religious content can emerge from the atmosphere and sensation, and spiritual privacy contributes to the therapeutic process. The 'power of the hybrid', as Charles Jencks calls it, is inherent in the Maggie's Centre enhancing architectural richness and human values. As he has been stating, since 1973, "the hybrid is difficult to achieve, certainly more demanding than single-minded attention to aesthetics and technology that the brilliant Mies van der Rohe followed. It is also as a language richer in scope, making full use of the architectural means including ornament, symbolism, craftsmanship, polychromies and metaphor. It signifies the return to architecture as a balanced and enjoyable art".¹¹

CONCLUSION

Consciously or unconsciously, the "non-labeling" of the Maggie's Centre as a therapeutic setting seems to be a good intuition of its CEO and paradoxically a way to achieve something simply by doing the opposite of the obvious. In phenomenology, intuition is considered a methodology of knowledge and the obvious can be enigmatic; this way of looking at the world destabilises what we are used to.¹² Within healthcare, as an extreme opposite of the static and passive condition of the cancer-patient within the hospital, Maggie's stands out for its exceptional architecture, warm atmosphere and uplifting feeling. By involving visitors in a dynamic space, the architecture allows for an embodied personalised experience and a sense of worth, and it all contributes to feeling in control and being empowered and that's why the patient says: "Maggie's doesn't feel like a hospital , and I don't feel like a patient "(Focus group_Dundee 2019).

On the lost tradition of the architecture of the *therapeutikós* of the ancient Greeks, the Maggie's Centre still considers the mind as important as the body. In receiving freedom, normality and flexibility, while reinforcing Jencks' vision, people say: "This is not the healthcare business, but it is the spirit business. And it's a very spiritual place really, in a non-religious sort of way" (Focus group_Oldham, 2019).

Experiential Design - Rethinking Relations Between People, Objects and Environments

NOTES

¹ Charles Jencks and Edwin Heathcote, *The Architecture of Hope: Maggie's cancer caring centres* (London: Frances Lincoln, 2010), 11.

² Charles Jencks, *The Architecture of Hope: Maggie's cancer caring centres* (London: Frances Lincoln, 2015), 7. ³ s.n. (2011a). Maggie's Architectural Brief [online]. Available at: <u>https://maggies-</u>

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⁴ Jencks, *The Architecture of Hope*, 7.

⁵ Ibid., 29.

⁶ Steven C. Hayes and Spencer Smith, *Get out of your mind & into your life. The new acceptance & commitment therapy* (Oakland: New Harbinger Publications, 2005), 3.

⁷ Maggie Keswick, motto <u>https://www.maggies.org/about-us/how-maggies-works/our-story/</u> (accessed 3 May 2020).

⁸ Michael Kearney, A place of healing (New Orleans: Spring Journal, Inc. 2009), 46.

⁹ Definition of Synergy, https://en.wikipedia.org/wiki/Synergy (accessed 3 May 2020).

¹⁰ Lesley Howells, *Synergy between people and place* (TEDx Talks, June 8, 2016). <u>https://www.youtube.com/watch?v=tvE78D30CbQ</u> (accessed 3 May 2020).

¹¹ Charles Jencks, *Modern Movements in Architecture* (London: Penguin Books, 1985), 8.

¹² Maria Armezzani, L'enigma dell'ovvio. La fenomenologia di Husserl come fondamento di un'altra psicologia (Padova: Unipress, 1998), 2.

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ARCHITECTURE AND DISABILITY: A QUALITATIVE STUDY OF THE INDIVIDUAL EXPERIENCES OF PEOPLE WITH MOBILITY, VISUAL AND HEARING IMPAIRMENTS IN SPORT AND LEISURE BUILDINGS

Authors:

ROBERTA CASSI, MASASHI KAJITA, OLGA POPOVIC LARSEN

Affiliation:

KADK – THE ROYAL DANISH ACADEMY OF FINE ARTS SCHOOLS OF ARCHITECTURE, DESIGN AND CONSERVATION, DENMARK

INTRODUCTION

The spatial experience of a person is unique and influenced by characteristics that belong to both the person and the environment. The user-environment relation that occurs every time a person carries out an activity within a spatial setting is the result of a dynamic interplay between personal and environmental characteristics. On the one hand, each person perceives and relates to dimensional and sensory spatial qualities according to individual kinaesthetic, visual, tactile and auditory abilities. On the other hand, possibilities of user's actions are dependent on the way the space is arranged.¹ The design of the architectural features of an environment might either allow, suggest and facilitate or forbid/hinder users' activities.

The combination of the individual abilities of the person and the design of the architectural features of the environment affects and qualifies the spatial experience and therefore the personal assessment of the built environment. When the design of architectural features is responsive to personal characteristics and necessities, the environment facilitates and supports user activities. In this case, the user qualifies the spatial experience positively. Contrarily, when the design is not responsive to user's needs and the demand for performing activities exceeds the abilities of the person, the environment is experienced as a barrier.² In this case, the user experiences a condition of disability and the quality of the space is negatively assessed.

With the aim of identifying the architectural features that better support activities of persons with mobility and sensory impairments, it is necessary to articulate the dynamic user-environment relation through a systematic investigation, which involves individual and environmental factors and their reciprocal interrelations.

This paper presents a qualitative study that investigates the individual spatial experiences of users with mobility, visual and hearing impairments, while they carry out activities in Sport and Leisure Buildings. It interrogates how users relate to the built environment, specifically focusing on how architectural features facilitate users' activities and contribute to enhance their personal perception of buildings' usability.

THE QUALITATIVE STUDY OF THE INDIVIDUAL SPATIAL EXPERIENCES: METHODOLOGY

With the aim of systematically investigating the user-environment relation, the study employs a newly developed analytical model (Figure 3). The model draws upon the theoretical concepts of *affordances* and *usability*. For the purpose of this study, the concept of *affordances* has been defined as the architectural features that suggest and support users' activities. While *usability* is defined as the personal assessment of the extent to which the environment supports social and physical individual needs during an action performance.

The model offers a structured way to address and analyze the complex interactions that occur while people with mobility, visual and hearing impairments perform activities within an environment. The analysis evaluates specific architectural features in relation to the user impairments and their personal assessment of usability. By linking the analysis of these interactions with the aspects of usability it is possible to advance the understanding of which architectural features support the active participation of people with mobility, visual and hearing impairments and how these features affect the overall usability of the building.

In fact, the use of the developed model allows to evaluate how architectural features - materiality, dimension, organization, lighting and acoustic - influence the personal user perception of physical and social criteria of building's usability - safety, cognition, body fit/low effort, comfort/wellbeing and social relevance.



Figure 1 The Analytical Model for the assessment of user-environment relation

The qualitative study has been carried out through non-participant observations and video-recorded semi-structured interviews. Users were observed while they engaged with activities in order to identify inclusive design solutions and understand how these influence users' behavior. Interviews, on the other hand, collected detailed and qualitative descriptions of individual spatial experiences under the first-person user perspective. The study involved 12 users, of which eight users with mobility impairments, two blind users and two deaf users.

Interviews and observations have been carried out in two selected case studies. These are contemporary buildings that implemented innovative approaches for an improved inclusion of people with physical and sensory impairments. The first case, *Vandhalla* (Odder, Denmark), is a sport, rehabilitation and water training building, which has been designed by Force4 and CUBO architects and completed in 2009 as an extension of Egmønt highschool (Figure 1). The second case, *Musholm* (Korsør, Denmark), is a sport and conference facility, designed by AART architects and completed in 2015 as an extension of a holyday residence (Figure 2).





Figure 2 Vandhalla

Figure 1 Musholm

During the interviews, users with different abilities were asked to describe their activities within the facility: the access into the building, the orientation as well as the use of bathrooms, changing rooms, and activities rooms. Questions were prepared for collecting information about:

1) which architectural features, do users with mobility, visual and hearing impairments interact the most while they carry out a selected activity?

2) how do these features support their activity by affecting one or more of the considered usability criteria?

The analysis of findings gathered from the non-participant observations and the semi-structured interviews allows us to articulate the diversity of spatial experiences and gain information for identifying the architectural features that best meet the needs and expectations of individuals.³

THE INDIVIDUAL SPATIAL EXPERIENCES OF PEOPLE WITH MOBILITY, VISUAL AND HEARING IMPAIRMENTS: FINDINGS

The way users perceive and experience the space contains information about how their needs and expectations are fulfilled and, therefore, how they can be better addressed for supporting and facilitating physical and social activities. In what follows, the users' personal perceptions and assessments of spatial experiences are presented for each usability criteria defined in the developed analytical model.

Safety

The users perceived the two buildings studied in this qualitative study as very safe. From what all the interviewed users stated, this is mainly due to the fact that both the buildings have wide and clear spaces where to easily move without physical obstacles and with multiple and level free openings to outside. Although safety did not appear as an issue for the buildings studied, two users with mobility impairments and one user with visual impairments explained how room dimensions and spatial organization can influence their perception of safety.

During the interviews at Vandhalla, the two users with mobility impairments referred to possible problems in relation to lack of sufficient manoeuvring spaces when rooms are crowded. One of the users with mobility impairments stated that "*in the dining hall, it can be difficult to get out all together after we have morning session. It gets pretty crowded, so I imagine it could be a problem in case we have to evacuate quickly*" (Figure 4). Two wheelchair users and one user with walking

impairments, when asked about their perception of safety during their activities, mentioned the presence and the distribution of bars in the swimming pool. The possibility to grab the bars and support themselves at the entry to the swimming-pool does not only make the access and the use of the pool safer, but also allow some persons to access independently without the assistance of another person (Figure 5).



Figure 4 Vandhalla - dining hall



Figure 5 Vandhalla - swimming pool's bars

During the interviews at Musholm, one user with visual impairments explained how the possibility of finding obstacles or not perceiving the steps while walking could be very dangerous. He described his concern with tripping over something while walking: "*if I am walking alone and there are things along the corridor like seats, low lamps, etc, then it can be dangerous if I do not catch them with my cane*".

Stairs are another source of danger for blind users who may not notice their presence. In Musholm, the long ramp that connects the ground floor with the first floor is interspersed with seating areas that are integrated within the thickness of the wall (Figure 6). Along the same ramp, the stairs are located on the side – not along the path. In addition, the stairs zone is clearly marked with different material, which is timber against PVC on the ramp (Figure 7). Furthermore, each step is marked and made more visible and perceivable with a strip in a contrasting color and texture



Figure 6 Musholm - seats along the ramp



Figure 7 Musholm - stairs on the side of the ramp

Cognition

The interviews showed that spatial cognition is a crucial aspect mostly for users with visually and hearing impairments.

During the interviews at Musholm, blind users explained how spatial dimensions and organizations might for example suggest directions and facilitate spatial navigation. One of the blind users stated that "the good thing of corridors is that I can easily move from A to B without getting lost many times".

Another blind user explained the importance of identifying the shower area inside the changing room, stating that "*the presence of these tiles usually suggests me the presence of water*". In Musholm, this is easily possible due to the change of wall finishing materials, from plastered to tiled wall. This change informs the user about the transition between dry and wet zones and therefore facilitates the identification of the shower area (Figure 8).

Any other graphical or tactile element may also improve the cognition of the space and facilitate the use. For example, the presence of tactile numbers on the lockers' doors allows blind or visually impaired users to perceive the numbers by sensing through fingers and to identify the right locker (Figure 9). One of the blind users stated that "usually, I start from a point of reference, like the wall, and I count the lockers. I know, for example, that mine is the third from the wall. But here I do not need to count".



Figure 8 Musholm - tiled wall in the shower zone



Figure 9 Musholm - raised tactile number

Interviews with hearing impaired users showed that architectural features such as the materiality, the organization and the lighting of the space enhance visual connection and contribute to improve the spatial cognition. In Vandhalla, multiple transparent openings around the large gymnastic hall allow users to be aware of what is happening inside and outside the room (Figure 10). For hearing impaired people who communicate with sign language or lip reading, it is important to have a lighting without glares to clearly see the interlocutor. In both the investigated buildings the balance between artificial and natural lighting is provided by skylights, openings, and distributed artificial lights (Figures 10, 11, 14, 15).



Figure 10 Vandhalla - transparent openings



Figure 11 Vandhalla - natural & artificial light

Body fit and low effort

An innovative inclusive design solution adopted in Vandhalla swimming pool is the raised edge of the pool (Figure 12). This rise, which is of variable height along the edge of the pool, facilitates the transfer from/to the wheelchair and allows users to go in and out from the pool independently.

Both in Musholm and Vandhalla, bathrooms differ in size, layout and fitted equipment. Lockers are located at different heights and showers are equipped with support handles on both the right and left sides. Users can choose the bathroom or the locker that fits better with their necessities. All the interviewed users with mobility impairments explained that the presence of at least one bathroom which fits with their needs allows them to use the bathroom without the need for assistance. In Vandhalla, within the changing rooms, bathrooms have different dispositions of the toilet, the sink, the shower and the handles. One user with mobility impairment stated that "*I always use this bathroom, because the handle is on the right side, which is the part of my body where I have more strength*". In Musholm, an electronic wheelchair user explained how important it is to have a bathroom that is large enough to enter and maneuver with her wheelchair, which is considerably larger compared to the manual one (Figure 13).

During the interviews, users with visually and hearing impairments did not mention any issue about the physical fit between their body and the environment. And yet, all the users with mobility impairments who had been interviewed explained how dimensions and proportions of occupied spaces can greatly influence their activities. Interviewed users described their physical impairments and explained how different spatial dimensions and equipment distribution, like doors width or furniture high and location, are more responsive to their personal needs.





Figure 12 Vandhalla - swimming pool's raised edge

Figure 13 Musholm - big size bathrooms

Comfort and wellbeing

The materiality, the lighting and the acoustic are the features that users have referred the most when asked about their perception of comfort and wellbeing. However, it was difficult for users to clearly explain how these features influence their perception of comfort and wellbeing. One user with mobility impairments, at Vandhalla, stated that "*As soon as you enter you see that it is a good place to be, you feel there is good karma*". Another deaf user, at Musholm, stated that "*I see that something good is going on here, but I do not why*".

Wheelchair users motivate their perception of comfort with the possibility to choose between spaces of different size and organization. The possibility to choose which bathroom, locker or shower to use, as described the above sub-section of *body fit and low effort*, makes them feel more comfortable. In the activity rooms, such as in the swimming pool in Vandhalla (Figure 14) and the gymnastic hall in Musholm (Figure 15), all the users, regardless of the disability, appreciate the natural/artificial lighting balance and the controlled acoustic, which improve their feeling of wellbeing and make more comfortable for them to stay and perform in the room.



Figure 14 Vandhalla - swimming pool / light



Figure 15 Musholm - gym hall

Social relevance

Design solutions that express equity and inclusion are important added values, which are recognized and appreciated by all the users, regardless of the impairments. In Vandhalla, all the wheelchair users referred to two design solutions: the access ramp to the swimming pool and the presence of unisex changing rooms. The ramp provides direct access to the water for wheelchair users. Due to this ramp, users do not have to use mechanical aids such as lifters, which are considered very embarrassing to use for all the wheelchair users interviewed (Figure 16). Another solution adopted in Vandhalla, which highly accommodates the needs of users who require assistance, is the presence of unisex changing room situated beside the single gender-dedicated ones (Figure 17). Users could in fact have personal health requirements or mobility challenges for which may require assistance from relatives or care givers of a different gender. This solution of providing the unisex facilities empowers users by leaving them the choice and avoids uncomfortable and embarrassing situations for themselves and for the others. One user with mobility impairments stated that "*I do not like to be naked in front of others, especially if they are men. In this way I am sure that in my changing room there are only women*".



Figure 16 Vandhalla - swimming pool's ramp



Figure 17 Vandhalla - unisex changing room

DISCUSSION

The research findings presented allow to make some considerations about the initial questions:

1) which architectural features, do users with mobility, visual and hearing impairments interact the most while they carry out a selected activity?

2) how do these features support their activity by affecting one or more of the considered usability criteria?

The interviews showed that, in the user-environment relationship, depending on the type of impairment, some architectural features are more relevant than others in supporting and enhancing users' activities. Due to the lack of certain abilities, users experience the environment by making full use of what the environment can offer them for performing the activity. Architectural features which are often used and designed by architects for purely aesthetic reasons, here are analyzed as *affordances* which contribute to facilitate users' activities and thus influence their perception of building's usability.

Users with mobility impairments

The activities that users with mobility impairments can perform in the environment are very dependent to rooms' size and organization. Limited body strength or the use of mobility aids such as wheelchairs, walkers or canes require the need for supports, larger spaces for maneuvers, level free accesses and solutions that can facilitate transfers to and from wheelchairs. Level free floor and accessible heights are considered by users as minimum requirements for accessibility. Specific dimensional and organizational solutions, such as the raised edge of the pool and the presence of bathrooms with different layouts, greatly increase the users' perception of body fit. The possibility to choose the space/room that best suits their needs – above all the possibility to carry out activities independently – increases the perception of comfort. (Figure 18)



Figure 18 User-environment relation - Mobility impairments

Users with visual impairments

Users with visual impairments experience the environment mostly through tactile and acoustic cues. These cues give them important information about building's organization and functions. Tactile cues are perceived by blind users, not only through the touch but also through the feet and the cane. Change of floor materials can inform users about directions and building's different zones and functions. In addition to this, the use of materials with good sound absorption allows blind users to better perceive the conformation of the space and the type of activity in progress.

Materiality and logical spatial organization support the user for a better spatial cognition and therefore an increased perception of safety and comfort. (Figure 19)



Figure 19 User-environment relation - Visual impairments

Users with hearing impairments

Because of the lack of acoustic cues, hearing impaired users need to establish and maintain eye contact with other people and with the space around. This allows them to get information about the circumstances that are going on in the building. The use of transparent materials and clear spatial organizations improve visual connection and allow them to see what is happening within the room, but also in adjacent rooms. The lighting of spaces should avoid glare or shaded areas in order to facilitate different types of communication used by hearing impaired and deaf users, like sign language and lip reading. The improved cognition of physical and social circumstances, which are given by the visual connection and a balanced lighting, makes users more comfortable in staying and performing their activities. (Figure 20)



Figure 20 User-environment relation - Hearing impairments

Regardless the impairment, the perception of comfort and well-being is subjective and influenced by individual and external variables, like moods, presence or absence of other people, weather, temperature, and so forth. The feeling of comfort is mostly described as a pleasant perception through all the senses, which make the user perceive a good atmosphere.⁴

Finally, any design solution that aim to empowering users' independency and dignity has a great influence on the perception of social inclusion. These solutions, in addition to facilitating and supporting users' activities, reflect the architect's intention to embrace and improve inclusiveness alongside with spatial accessibility and functionality.

CONCLUSION

Different individual kinaesthetic, visual, tactile and auditory abilities imply different ways of perceiving and using the built environment. Although spatial experiences are unique and based on personal expectations and perceptions, the qualitative study showed a relationship between the type of impairments and the architectural features that most influence the spatial experience and the personal perception of building's usability.

A further collection of users' spatial experience within the developed analytical framework will widen the understanding about how users with physical and sensory impairments relate with the environment and how architectural features can be better designed for supporting users' sport and leisure activities. This knowledge will give new contribution to the theoretical understanding of the design for the inclusion and it will also provide guiding principles for architects and designers for the design of physical settings that better fit with the variety of users' necessities and expectations.

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NOTES

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³ Winance, Myriam. "Universal design and the challenge of diversity: reflections on the principles of UD, based on empirical research of people's mobility." *Disability and Rehabilitation* 36, no. 16 (2014): 1334-1343.

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QUITO OPEN CODE, BETWEEN FRAGILITY AND MODIFICATION.

Author:

PAOLA BRACCHI, DARIO GIORDANELLI

Affiliation:

FACULTAD DE ARQUITECTURA Y URBANISMO, UNIVERSIDAD UTE DE QUITO, ECUADOR

QUITO. GEOGRAPHY AND URBAN GROWTH

San Francisco de Quito is one of the oldest cities in Latin America. It is the capital and the political, cultural and financial centre of the Republic of Ecuador. It is located at an average height of 2850 m.a.s.l. in the Andes range, more accurately within the Guayllabamba valley, in the Inter-Andean Alley plateau which separates the eastern and western sides of the Andean range. The city's western end is defined by the eastern slopes of the active Pichincha volcano, which dominates the urban extension in such way that its hillsides are visible from any angle, shaping the city's sectors. This geographical condition gives the city its peculiar elongated pattern, with 50 km in length and averaging 3 to 7 km in width, traversed by more than 100 ravines from east to west. The city, located about 25 km north of Quito's old town, is crossed by the equator, which produces significant landscape diversity. The geo-morphological and geological conformation comes from the presence of the Pichincha volcano. The soil is composed of deep layers of lava and ash which have little resistance to river erosion and harden in contact with air. This has allowed the preservation until recent times of the engravings generated by the last ice melting: a system of seasonal watercourses, "quebradas". It is a system of intermittently-formed rivers that rhythmically go through the city's plain from east to west (Peltre 1989)



Images 1 - Quito's Ravines original system. P.Peltre (1989)

Such geological formation determines a privileged condition not only from the environmental point of view (note 2), but also for defensive purposes, so much that the Incas decided to install one of their cities in this territory. Quebradas were natural barriers that were difficult to cross. These ravines can reach 15-20 metres of depth with steep edges and strong slopes (20-30 degrees). They constitute an important natural drainage network which has been modified over time to favour the city's growth. According to current urban development there are more than 120 ravines, many of which have been filled up (Peltre 1989).

The foundation of Colonial Quito (San Francisco de Quito, 1534) is based on a reticulated urban layout, typical of a colonial town, inspired by the Roman castrum reticular structure. The regular checkerboard was adapted to the site's topography, where necessary adjustments were made not so much due to mountain hillsides but mostly because of the presence of ravines (quebradas). Modifications to the squared block model used originally in the colonial city were made with the objective of allowing the passing of water streams. The conquerors did not respect the presence of ravines for their environmental role, but because the fluvial pathways were used as dumping sites, which could get rid of urban trash using water power. From the 18th century onwards, the ravines began to be closed in a fragmented and discontinuous manner according to particular interests (Crespo 2004). This phenomenon became symptomatic and recurrent when the city began to grow consistently outside the limits of the colonial model, that is, from the 20th century onwards. While in 1902 the city took up 300 hectares of land, this number increased to 1300 hectares in 1950 and currently the whole Distrito Metropolitano (which includes the city and its surroundings) has an area of 290746 hectares. Urbanised land has an area of 43116 hectares. From the second half of the 20th century until now the size of Quito has grown tenfold, with a significant acceleration in the last decade. Its urban population reached 1.98 million people according to the latest census.



Image 2 - Quito historical map 1858. The quebradas interrupted by the growth of the urban fabric. Source: Secretaría del territorio, Alcaldía de Quito. http://sthv.quito.gob.ec/archivo-historico/

The need to respond to such phenomenon of accelerated and invasive growth through the north-south spectrum, but also along the valley's slopes, has led to decisions being made on the basis of urgency rather than on structured and integrated thinking of the city. A radical change in the relationship with the natural context took place: the ravines, seen as elements which prevent fast growth, instead of being interpreted as systems of environmental framing for urban development, were literally erased from maps. For contemporary society the quebradas, silent traces embedded by the uneven tissues of the city, are an element of great fragility that is expressed in a silent risk but always present, which occurs punctually, but consistently, with the first torrential rains of the humid seasons. The geographical memory of a millenary past was voluntarily removed from the decision-making processes on the city's urban development.



Image 3 - Quito historical map 1922. The quebradas interrupted by the growth of the urban fabric. Source: Secretaría del territorio, Alcaldía de Quito. http://sthv.quito.gob.ec/archivo-historico/

ABOUT THE CONCEPT OF MEMORY AND ITS LOSS

The removal of quebradas was not limited to the physical territory and city maps. The filling involved an apparent disappearance, smoothing the roughness and gorges that clearly marked the route, disappearing from the spatial references of contemporary Quito's citizens. The population over time forgot that the quebradas, unsafe spaces and at risk of seasonal flooding, were a place unsuitable for construction and requiring space so that the waters coming from upstream would discharge downstream. Therefore, it is necessary to recover this ancestral memory of the paths of seasonal streams, which were filled and often built on with road infrastructure, applying architectural regeneration operations in such a way as to avoid the dangerous collapse of the urban system with consequent flooding and landslides.

This requires using memory as an active element of transformation of built parts of the city that often unconsciously are at risk for poor or no permeability of the soil. This phenomenon implies that in the case of heavy rainfall, as in the case of rainy seasons, water does not find its natural outlet in the local structures of the quebradas and violently causes damage to everything it encounters along obstructed interrupted or deviated routes. It is appropriate to define the particular meaning that this study attributes to memory in order to define the concept of active and transformative memory as opposed to passive and conservative memory. In the Treccani Encyclopedia the term memory is defined as a process linked to the genesis of a modification (note (Encyclopedia treccani) and it is in this meaning that the present study interprets this word. If memory is a process of shape modification, it can be said that it is a dynamic phenomenon, which involves one or more transformations, not static. This clarification implies a radical departure from the common perception of this word in architectural theory and practice, in which often "memory" becomes a taboo of exceedingly conservative tendencies linked to the rhetoric of the immutability of the objects considered as documents. In fact, the need for stability of our liquid time (Bauman 2000) combined with the rhetoric of the "end of history" (Fukuyama 1992), have contributed to the tendency of using memory as a passive form of "mummification" of the architectural document subject to intervention, in order to cancel the deformation suffered by the form over time. To consider memory as passive action is typical of some conservative positions. The root of this antithetical conception is perhaps precisely in the simultaneous and dialectical presence of these two opposite tendencies (progressive and regressive) related to the operativity of the term "memory" as a function of the reaction to the critical or catastrophic deformation of the form.

GOALS

The goal of the article is, through the case study of Quito, to demonstrate how the loss of the urbangeographic memory of the places generates a series of physical-spatial, technological-environmental and socio-cultural problems, which determine conditions of fragility.

APPROACH AND METHODS

The approach, totally new compared to the studies carried out on Quito up until now, consists in a simultaneous vision of the relationship between the original geo-morphological condition, the urban development over time and the conditions of morpho-climatic risk that make up a general framework of exceptional fragility.



Image 4- Hydrogeographic system of Quito and its territory. In the red framework is visible the ravine absence. Source: IGN-DMPT

In order to achieve the intended objective, a step-by-step methodology is used to recognise and sustain the current phenomenon in order to open up future urban regeneration scenarios based on the reinterpretation of the traces of a recent past.

The method is developed according to two differentiated and related channels that are realized in three phases of study. On the one hand, an analysis and interpretation of the cartography will be conducted, which thanks to their overlap becomes a tool to unveil the tracks. On the other hand, there is a recompilation of events that highlight the physical, social and environmental effects of removing quebradas from the urban fabric of Quito.



Image 5 - Pichincha slope water system facing with the valley. Surface runoff and Groundwater flow Source: Bracchi, D. (2020)

A first analytical-descriptive phase allows highlighting, through a sequence of historical maps, how the urban growth has gradually erased the presence of quebradas. The physical elimination of a geographic element has subsequently led to obvious infrastructural criticalities in the city's hydrogeological malfunctioning. More than 80% of the quebradas in Quito have been buried or filled; this generates risks of flooding and landslides. The first drainage system in Quito began construction in 1905, with the water discharge network placed in the ravines until their filling. In the beginning of the 20th century, the widespread conception of ravines was that they served only as evacuation systems for used wastewater, rainwater and trash. Environmental issues, such as the reduction of natural drainage these actions entail (Hazen&Sawyer 2011), were not reflected upon then. Hazen and Sawyer's report on EPMAPS, together with other relevant documents, confirm that the sewage system, even if partially fixed, continues to be the same than in 1900 and still works as initially conceived: through a combined form. This means both rainwater and wastewater (disposal water from human activity) run through the same pipes (Hazen&Sawyer 2011)

The state of the sewage system reveals important issues:

1. Sewer pipe combined usage and capacity. The diameter of pipes used in the early 20th century does not respond to the increase of fluid volume generated by larger population and higher torrential rain intensity due to climate change.

2. Obsolescence. Many pipes remain the same than in the beginning of the 20th century. The old sewer pipes have varied forms, made through composite construction (stone, brick and concrete) and present holes and infiltrations. There are quick obsolescence processes in more recent pipes due to lack of maintenance, sediment accumulation and construction defects.

3. Underground dripping. The joining of sewer pipes is often done in forced angles and at great speed, leading to hydraulic singularities which damage the sewer pipes (Hazen&Sawyer 2011). This is observed at the contact point between the slopes and the plain, exhibiting underground dripping parallel to the sewer pipes (Peltre 1989). Unstable filled soil can reveal underground erosion which can lead to street sinking, as it happened with the sinking of Vial del Trebol in 2008 and the recent street sinking between the Amazonas and Naciones Unidas avenues (21 January 2020).

4. Torrential lava/mud flows. At times of intense torrential rain, the generated flows above the ravines can bring up soil and mud which block the pipes. These flows seek other routes towards the lower plain and along the streets, knocking down what they find in the way (mud flow in Barrio del Pinar Alto, March 2019).

From a socio-cultural point of view, the lack of knowledge of their geographical pre-existence by authorities and population, allows the construction of houses, urban spaces and infrastructures in the filled ravines beds. This fact puts the population in a condition of risk.

A second critical-interpretative phase allows the creation of a synergistic framework, where previously collected information shared among all parties. An overlap of maps highlights the relationship between the quebradas deleted and the contemporary urban condition.

This first interpretative map constitutes the basis of a process of Coding of the current condition (physical/social/environmental and morphology/typology/technological) of those urban sections that were originally crossed by quebradas.



Image 6 - Quito Open Code. Quito diachronic map. Visible (blu) and invisible (red) ravine traces. Source: Bracchi,P., Giordanelli, D. (2019)

The third phase (prepositive-operative), starting from the study of the codification of the present conditions (code) is able to recognize differences and similarities of behaviour that allow us to define a taxonomy of possible design actions. Such actions, by changing the code, can rescue not the image, but the environmental and regulatory role that quebradas can have on future urban choices. These set of operations consider memory as an active tool for transformation. The revealed ravine's hidden system shown in the map, demonstrate the high fragility of Quito's urban landscape, but at the same time these areas can be interpreted as the spaces able to invert the tendency. Understanding the importance of the memory role inside the urban fabrics is crucial in order to define the variables of the action code in time.

RESULTS

The methodology comes to the definition of an interpretative code that is known as Open Code. This is a matrix evolving over time (or in evolution) that uses active memory as a design tool and allows the modification of physical-environmental-social variables, transforming a fragile condition into a state of opportunity for the future Quito.

The study relates three parameters that had never been studied together before: memory/geomorphology (quebradas)/risk, highlighting the interrelationship between these three aspects and their socio-spatial expression. The system of these variables confirms the fact that Quito is in a state of fragility due to the deliberate loss of memory. The main morpho-climatic risk conditions are located in those areas where the quebradas have been buried and deleted.

CONCLUSION

The need to establish a relationship with the memory of places highlights the need for a paradigm shift in urban development choices. It is precisely the condition of fragility that allows opining up innovative scenarios of regeneration in which the presence of the quebradas system is not a marginal reality, but a fundamental component of the transformative project on the city. The fragility of this

system guides the architectural project towards new integrated strategies. Its revealing repercussions also demonstrate that ravines are not isolated and fragmented elements, but are part of a system able to establish a relation between the urban space, as a whole, and the surrounding Andean landscape. In this sense the natural context, now considered as something separated from the city, like a background, will be reintroduced inside the urban fabric with an environmental role. This new green infrastructure system will be able to face the morpho-climatic risk detected.

This innovative change overturns the current concept by ensuring that such fragments inserted in the complex system of the quebradas take protagonist role in the future rethinking of Quito.

The concept of Open Code presents the new urban system not as something fixed but as open to changes over This is the result of a system based on a dynamic interaction between the original geomorphological traces and the ones related to the city in expansion.

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UNVEILING THE PRENATAL ORIGIN OF THE CHILD CAVES PHENOMENON

Author: JOHN DAVID FLORES

Affiliation: UNIVERSITY OF CALIFORNIA AT MERCED, USA

INTRODUCTION

(Author's note: the following is taken from a much larger thesis in which more detail and theoretical analysis regarding the Caves and their potential relationship to prenatal experience is provided. In order to meet the word count limit, I sought a more consolidated approach, which I hope has not compromised the power of the underlying argument or its interdisciplinary implications. In any case, please enjoy what I like to think of as an interrogation into one of the many playful mysteries of early childhood.)

Throughout history, children of all ages have been observed to manufacture spaces that some have referred to, metaphorically, as "little houses," "dens and forts," "cozy places," and "child caves."¹ (see Figure 1). These mysterious little places often take on a wide variety of forms, using an equally diverse set of materials and yet are typically located either within, or in close proximity to the family home. For many who have studied these childish constructions, their functions are viewed as vital to a child's psychological and emotional well-being, and hence, healthful development.

This essay interrogates these magical spaces of play at several levels, using theory from a broad corpus of theoretical perspectives, including: architectural design, psychoanalytic and prenatal cognitive science, to isolate the conceptual origins/functionality of these ubiquitous, playful manifestations.





Figure 2: Taken from Christopher Alexander's illustrations of the Child Caves in his book, A Pattern Language, pattern: 202.
PART 1. THE PHENOMENON OF THE CHILD CAVES

At the outset of the children's book, *A Little House of Your Own*, author Beatrice Schenk de Regniers states somewhat cryptically:

Everyone has to have a little house of his own. Every boy has to have his own little house. Every girl should have a little house all to herself. Of course you live in a house with your mother and father. But this isn't what I mean. That isn't what I mean at all.²

In this way, de Regniers, identifies a special kind of "house" that is at once distinct from the traditional family home and yet, for the child, just as indispensable. But what is it that distinguishes the so-called *little house* besides-its-size from its larger formulation? de Regnier, through an autobiographical recollection and a fanciful illustration by Irene Haas, provides the answer:

When I was a little girl my mother had a dining room table [see Figure 2]. It was a round table with a big white tablecloth on it. When I was a little girl I lived under the dining room table...and all the time I was in my secret house, my under-the-table house, my little house all to myself.³



Figure 3 A so-called "found" construction of the child cave-little house.

Thus, de Regniers reveals that the "little house" is not a house at all but rather a childish appropriation of space embodying certain qualities and characteristics, which make it a metaphor of the more traditional structure that society and culture refer to as a "house." From this example, we can discern several, essential qualities of the *little house* that make it at once unique from, and yet similar to, its metaphoric correlate. Firstly, and most importantly, it is conceived and instantiated by the child. In other words, the child decides what is and what is not her or his "little house." Secondly, its composition affords an internal environment in which the child feels a sense of complete autonomy from the outside world, even when its physical composition must rely on material elements appropriated from that world. As de Regniers recalls, hers was, "a secret house. Nobody could see me. Nobody could find me."⁴ In this way, the notion of "autonomy" is reflected in both its production and the emotional atmosphere it engenders. Moreover, it can be said that the "little house" is an architectural metaphor for childish independence from the outside world.

Another important aspect of the "little house" is revealed in its emphasis on interior functionality over external form. Throughout her illustrations, de Regniers demonstrates what matters most in its design and manifestation is not what it looks like on the outside, but what happens on the inside. In his book,

A Pattern Language, architectural theorist, Christopher Alexander, reaffirms this essential quality of the 'little house', in his elaboration of a structural pattern he refers to as, the "Child Caves."⁵

According to Alexander, "in the course of their play, young children seek out cave-like spaces to get into and under—old crates, *under tables* [*italics* mine], in tents, etc. [see Figures 3 - 6]."⁶ The reason, he suggests, is that "most of the world about them is "adult space" and they are trying to carve out a place that is kid size."⁷ Thus, according to Alexander, the primary emphasis of the child cave pattern is not on the external aesthetics, but rather, the interior function of the space as a site "specially devoted to children's play."⁸ It is this elevation of function over form that, Alexander argues, is the primary reason for the seemingly endless variety of possible formulations.⁹



Figure 4 A fort like construction.

And yet, the fact that a young child is able to conceptualize and deploy a structure based on a clear understanding of its essential, interior functionality, suggests the existence of a precedent, an *original space* of which the child is well familiar and thus able to replicate in her or his immediate environment, ad hoc. In this way, every instantiation of a child cave, or little house, can be seen as representative of an original. How though, can we determine the original source from which all of these childish constructions derive?

According to Alexander, all construction is based on "patterns."¹⁰ These "patterns," are like the words and phrases of a language that, when combined, enable us to organize space in such a way as to produce a recognizable form like a house or a room. Over time, these patterns form a "pattern language," which becomes the basis for "all acts of building."¹¹ Therefore, whenever one is confronted with a problem requiring an architectural solution, she or he must rely on the unique "pattern language" she or he has acquired over time. As Alexander states, "Your pattern language is the sum total of *your* knowledge of how to build."¹² And yet, in stating this fact, we are forced to acknowledge that, with regards to the childish construction of the child cave, or, little house, the pattern languages upon which they are based are limited by the child's obvious lack of experience in the world.



Figure 5 The cardboard box cave.

This is not to say that younger children have no sense of a pattern language from which to base their designs. As has already been argued, for a child to be able to identify and then appropriate a suitable location as her or his own special property indicates an awareness of certain essential characteristics necessary to produce the desired environment, and the ability to recognize those qualities as already existing within a particular site. Thus, to better ascertain the origins of the child's primitive pattern language we must first describe those qualities which seem common, and therefore, essential, to all such spatial manifestations.

PART II. CONSIDERING THE FUNCTIONS OF THE CHILD CAVE IN RELATION TO ITS ORIGINS

In the previous section, we learned that humans rely on a "system of patterns" to organize and shape the world around them.¹³ This system can be likened to an architectural language in which the individual patterns comprise the various words and phrases. Once a sequence of patterns is established, these become like coherent sentences that are easily recognized by their form and function.

Thus, to understand the child cave form is to understand its functions, and hence, the problem(s) it seeks to solve. And yet, we recognize that, as an architectural metaphor, it must encompass a wide variety of formulations. Therefore, instead of focusing on the multi-various expressions for which the metaphor *child caves* can be applied, we will concentrate on those primitive forms which we have been previously described as *found*, or appropriated, spaces within the house.¹⁴ We do this for two reasons: firstly, like the word *house*, all child caves are supportive of a particular set of repeated activities, and thus, all provide the same essential functions. Secondly, since our goal is to unveil the origins of this childish construction, it makes sense to focus on those that can be viewed as antecedent to the rest; those that are closest in temporal proximity to the original.

As we learned in our readings of de Regnier¹⁵ and Alexander¹⁶, one of the earliest forms of child cave is a simple appropriation of space beneath a table in the house (see Figure 5). In all of the examples the appropriated table is covered either with a tablecloth or a blanket or some piece of material that serves to both contain and hide the space below and to isolate it from the surrounding area as well as any surrounding people. Thus, we arrive at the first essential characteristic and function of the child cave, as previously stated, *socio-spatial isolation*. In addition, we note from the size of the space produced, a second essential characteristic, and hence, function of the cave, *single-occupancy*.



Figure 6 The simplest of child caves.

This indicates that in creating the cave, the child is seeking a space that is at once separate and hidden from all other spaces that surround it and exclusive in her or his usage. Hence, we can say that an essential aspect of the cave environment is the *intimacy* it affords, and with this, the sense of autonomy it engenders. As noted child educator, David Sobel, states from his research on the child cave phenomenon, these interrelated features of the cave continue to be fundamental, even as the child grows older and more efficient in building her or his own space, "In almost all cases cited, children expressed a need for privacy, independence, and self-sufficiency...[and] separateness from the world of parents and family [see Figure 6]."¹⁷



Figure 7 A private site for the performance of life and play.

For Sobel and de Regnier, these essential qualities of intimacy and autonomy are generative of a third, vitally important characteristic of the child cave environment, a sense of, "*security [italics mine]*."¹⁸ This is affirmed by several of the activities that both Sobel and de Regnier suggest are typical to the cave, in particular, "sleeping" and reading (see Figure 1).¹⁹ In this regard, it can also be claimed that the child cave is *comfortable*.

Another activity supported by the cave environment, and fundamental to its functionality, is the performance of individual play. As one of several "places specially devoted to children's play," Alexander identifies the cave as a site of a particular *kind* of play that is crucial to the young child's psychological and emotional development:

A child's play is his way of dealing with issues of his growth, of relieving tensions and exploring the future. It reflects directly the problems and joys of his social reality. Children come to terms with the

world, wrestle with their pictures of it, and reform these pictures constantly, through those adventures of imagination we call play."²⁰

Expanding on the importance of this kind of imaginative or "representative" play, the philosopher Eugen Fink argues, "play is a basic existential phenomenon, just as primordial and autonomous as death, love, work and struggle for power, but it is *not* bound to these phenomena in a common ultimate purpose. Play, so to speak, confronts them all – it absorbs them by representing them. We play at being serious, we play truth, we play reality, we play work and struggle, we play love and death – and we play even play itself."²¹ In this way, the child cave can also be viewed as a site of *learning*.

A final characteristic that is evident in all such childish constructions is perceived by their impermanence. Regardless of whether they are *found* or constructed, appropriated in the house, or deployed outside, the child recognizes all such structures as being *temporary* in nature. It is perhaps for this reason, amongst others, that children are willing to appropriate spaces clearly marked for other purposes, such as the dining room table. Moreover, it may indicate that such sites have a limited usefulness in a world in which social activity and interaction are so vital to a child's healthful development. In other words, the little house is always viewed as a temporary place of retreat, a momentary oasis from the adult world.

To summarize, therefore, we can say that the following are essential characteristics and functions of the child cave:

the child cave is separate and isolated the child cave is intimate and autonomous the child cave is secure and safe the child cave is comfortable the child cave is a site of play, learning, and living (sleeping, eating, etc.) the child cave promotes a child's healthful development

And finally,

the child cave is temporary.

Thus, for the child, the *child cave* represents more than a simple manipulation or embodiment of space; rather, it signifies a particular and complex, temporary habitat whose primary functions are to enliven the performance and practice of a wide variety of activities in an environment in which she or he feels totally empowered and separate from the outside world. The fact that the child is the author of this extraordinary site, and its designer and builder, presents us with an enigma. How is a young child, without even the vocabulary to describe the basic formalities of the child cave and its construction, able to conceive and identify the space needed for its deployment?

PART III. BRIEFLY, THE CHILD CAVE AS ARCHITECTURAL METAPHOR FOR THE WOMB

The fact that the child is able to recognize one space as more appropriate than another, ad hoc, suggests a deep familiarity with the environmental prerequisites. And yet, there appears to be no evidence of a pre-trial-and-error period that could explain the child's confident understanding of such a complex phenomenon. The basis for the child's wisdom is not to be found in the numerous developmental activities that typify its infancy; instead, I suggest that the *child cave* is in fact an attempt by the child to recreate the womb in its extra-uterine reality, and thus her or his knowledge

and understanding regarding its formulation represents a memory carried over from the child's prenatal experience.

According to Roger Hart in his work, *Children's Experience of Place*, this connection between the child caves and the womb was first posited by so-called "Freudian psychologists" who "explained" the construction of "cozy places"²² as a desire on the child's part to return to the womb."²³ For example, Dr. Susan Isaacs, a pioneer of child psychology and proponent of Freudian psychoanalytics, gives an interesting analysis of the *womb/cozy cave* relationship in her book, *Social Development in Young Children*.²⁴ In creating the child cave, Dr. Isaacs argues, "The child says in his behavior...inside my Mummy, I... only have to be there and everything is given to me."²⁵ To Isaacs, and other "Freudians" therefore, the construction of the cave is motivated by the child's desire to create a womblike space where it knows all of its physical and emotional needs are met. Moreover, it is a space that is bereft of any and all stress and tension. It is what Dr. Ernest Schachtel described as "the original peaceful state of absence of consciousness and stimulation in foetal 'sleep."²⁶ And yet, this Freudian perspective would seem to conflict with the core hypothesis of this essay, that the cave, as an architectural metaphor, is a site of play and living based on the child's prenatal memory of her or his intra-uterine experience.

Over the past half-century, advances in the biological sciences haven given evidence of the important cognitive development that begins around the third trimester of pregnancy. In his essay," Considering Gestational Life," Dr. Thomas Cohen states:

At some time during gestation, (possibly near 26 weeks) and on some mental level, the fetus becomes aware of his or her own history and has some implicit memory of it...Examples of this include showing preferences for voices, music, smell, and taste from prenatal experience. In addition, the fetus itself is not stagnant, far from from it.²⁷

Rather than a place of Freudian state of unconscious sleep, Dr. Cohen reveals the womb to be a magical site of both psychological and physical activity. Moreover, it is an experience that transcends the womb into extra-uterine reality as memory. If a newborn can recall, "voices, music, smell," from its prenatal life, it seems reasonable to suggest that it, likewise, will have some recollection of its experiences of the womb as its first home.

PART IV. PRACTICAL APPLICATION OF THE CHILD CAVE DESIGN

From an architectural design perspective, the child caves provide important insights as to the functions children prioritize in their self-created play-spaces. These may be highly useful to the playground, classroom, daycare, or home designer as a starting point to creating an environment the child will recognize as generative of the kind of emotional connection that enlivens the imagination and creativity, more specifically, in creating a place that is '*intimate and autonomous, secure and safe, comfortable and 'cozy*,' and finally, '*a site of play, learning, and living (sleeping, eating, etc.)*.'

NOTES

¹ Christopher Alexander and others, *A Pattern Language: Towns Buildings Construction* (New York: Oxford University Press, 1977) Kindle edition, 926 (Location 10431).

² Beatrice Schenk de Regniers and Irene Haas, *A Little House of Your Own* (New York: Harcourt, Brace & World, 1954), 2-3.

³ de Regniers, 6.

⁴ de Regniers, 5.

⁵ Alexander, *Pattern Language*, 926 (Location, 10431).

⁶ Alexander, 928 (Location, 10435).

⁷ Alexander, 928 (Location, 10443).

⁸ See note 6 above.

⁹ Christopher Alexander, The Timeless Way of Building (New York: Oxford University Press, 1979), 176.

¹⁰ Alexander, *The Timeless Way*, 178-187.

¹¹ Alexander, 193.

¹² Alexander, 202-203.

¹³ See note 10 above.

¹⁴ See note 13 above.

¹⁵ See note 3 above.

¹⁶ See note 6 above.

¹⁷ Sobel, *Children's Special Places*, Location 552.

¹⁸ Sobel, Location 540.

¹⁹ See note 23 above.

²⁰ Alexander, A Pattern Language, 368, (Location 4413).

²¹ Eugen Fink, Ute Saine, and Thomas Saine, "The Oasis of Happiness: Toward an Ontology of Play," Yale French Studies, no. 41 (1968): 22, https://doi.org/10.2307/2929663.

²² Another term for child caves, little houses, special places, etc.

²³ Roger Hart, *Children's Experiences of Place* (New York: Irvington Publishers Inc. 1979), 210.

²⁴ Susan Isaacs, *Social Development in Young Children* (New York: Harcourt Brace, 1933). <u>https://archive.org/details/in.ernet.dli.2015.6697</u>

²⁵ Isaacs, Social Development, 363. <u>https://archive.org/details/in.ernet.dli.2015.6697/page/n374</u>

²⁶ Schachtel, Ernest G. *Metamorphosis: on the Development of Affect, Perception, Attention, and Memory.* (NewYork:BasicBooks,1959) 10. <u>http://www.archive.org/details/metamorphosisond00scha</u>.

²⁷ Thomas Cohen, "Considering Gestational Life," Psychoanalytic Dialogues 27, no. 5 (2017): 565. <u>https://doi.org/10.1080/10481885.2017.1355687</u>

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PRODUCT DESIGN ETHICS – THE NAUGHTY HELMET

Author: **DAVID DOMERMUTH**

Affiliation: APPALACHIAN STATE UNIVERSITY, USA

INTRODUCTION

We teachers do our best to impart knowledge and hopefully point our students on the best path. But what happens when they take the knowledge and choose a darker destination? Are we to blame, could we have done something differently, is it our job to teach morals and ethics? New teachers just try to hang on, go through the hoops of the job, try to learn how to be effective, and try to maintain some of their individuality. But as time goes on, they become proficient, and the question of ethical education might arise. Until recently, ethical education consisted of avoid weapons of mass destruction and sex toys; but accidental, long term exposure to a horribly designed bike helmet forcibly brought the subject of moral education to the forefront. The objective of this paper is to lead the reader along the same path of discovery that I experienced. To reconstruct how a group of designers could end up with an unsafe, safety device, and shamelessly market it to the gullible public. Then investigate the question of blame. Is it basic genetics that motivates a group of people to the end of "anything for a buck", or society, or could our educational system share some of the guilt? So, look forward to a convoluted examination of our "anything for a buck" educational system.

Design ethics background

Rodgers and Milton call it "the increasingly contentious field of design ethics."¹ They do a fine job discussing ethics and sustainability and provide a checklist with eighteen ethical guidelines for product designers. On the other hand, the Industrial Design Society of America, IDSA also has a list of five "Fundamental Ethical Principles" along with six "Articles of Ethical Practice"² but they don't definitively explain what an acceptable product is and what is not. The published "Code of Ethics", is about 500 words long and reads like "death through over editing" by committee; vague, all encompassing, feel good - don't hurt anybody or thing. I tested the code against a weapon for killing endangered animals, the code failed. It does not discriminate against specific products. It does mention safety and wellbeing. Jim Lesko wrote an excellent materials and manufacturing textbook specifically for Industrial Designers, published in 2008³. I have used this text for years but was surprised to find no mention of ethics or sustainability. Whereas "The Measure of Man and Woman" a standard text and anatomical reference can be inferred to represent ethics because it has hundreds of do's and don'ts for design⁴. During a student's fundamental and formative training, they will inevitably be introduced to universal design, sustainable design, safety, function, ergonomics, form, and marketing. But not necessarily, a list of "chiseled in stone" specifics for acceptable products, product standards, or performance. A search of the internet for ethical guidance also fails. Five or

more promising sites come up but none of them provide a quick list or guide for ethical product design.

THE HELMET STORY

Spoiler alert: The design was compromised in order to pass the crash test and sell the product. The author is his own expert; a PhD Mechanical Engineer, Professor of Product Design, and long-term cyclist. 44 years of cycling, 100,000 plus miles, including more 24,000 miles of long distance, self-supported tours. 8 tours in the USA and Canada, and 4 tours in Europe. He was aware that "my comfortable bike helmet" was long overdue for replacement. At least that is what the local bike shop advocates; replace every two years. He purchased the latest and greatest, concussion reducing wonder, a MIPS helmet, see below. "I should have done my homework and not ended up writing this paper". "The government testing body in the US, the Consumer Product Safety Commission (CPSC), recommends replacing a bicycle helmet every five to 10 years."⁵ After a six week wait, He got the wonder device, briefly tested it, and left on the adventure. It was not a great fit, but (switching to first person) I assumed, like all helmets, it was just a matter of adjustment. I ended up testing the helmet on a 2,000-mile, bike packing tour; 50 miles per day, 40 days of riding. (Denver-Portland-Everett) The helmet was miserable for the first 1,000 miles and I cursed the designers for hours. Then started outlining this paper in my head.

MIPS?

"In recent years, we've seen more and more bike helmet brands adopt MIPS. MIPS stands for Multidirectional Impact Protection System and helmet providers using it build the layer into their own helmets. The MIPS liner is designed to reduce rotational forces on the brain that can occur in the event of a crash, by adding an extra layer of friction and thus spreading the impact. Helmets with MIPS layers often cost a little more – but there is evidence to suggest the layer is effective in reducing injury in certain types of crashes."⁶

Design failures

The helmet ended up with more than six design failures. The first failure was extending the lower part of the helmet with bumps. Bicyclist wear glasses to reduce wind burn and sunglasses to reduce glare. The glasses are an essential safety tool which the helmet interferes with. The bumps work great for reducing side impact on the crash dummy test, but They are uncomfortable and irritating. So instead of concentrating on riding the rider is continually pushing the helmet up, which is distracting and unsafe. And the helmet bumps push the glasses into the bridge of the nose. I was dumb founded. How could such a poor design make it to market? How could a safety device not be safe? And it gets worse.

The second notable failure is a one hand chin strap buckle design. It is nice, but the adjusting web strap on the right side loosens over time. The rider must continually retighten the strap. Somehow this innovation was pushed into production without real field testing. This is the principle liability of the helmet – it cannot be defended in a lawsuit because the loose helmet will expose the brow for impact. It takes about 30 minutes of riding to become loose and wouldn't be noticed in a static dummy test of the helmet. Which means that the helmet testing protocol is flawed. The Virginia Tech7 crash test should require dynamic use prior to impact.

Design failure three, the head strap

This has three flaws. A) The strap and tightening knob are located below the external occipital protuberance. (the bony knot on the back of the skull) This is a sensitive part of the body and we don't like pressure there. large tendons connect to it, to support and tilt the skull. Consequently, users are not likely to crank down on the knob and tighten the strap. B) the Boa type tightening mechanism is uncomfortable compared with traditional systems. You can feel the wires digging into your head. C) When you do tighten the head strap the helmet rotates forward pressing even harder on you glasses and cramming them down on the bridge of your nose. So, we must leave it loose. The Boa tightening mechanism is also used on shoes and ski boots. It is just a fad that designers like to use to sell product to the gullible consumer. There was nothing wrong with the tried and true traditional mechanism but adding new features could help entice riders to pay triple the price.

Business failure

This Helmet design is a classic example of forcing a product around a new technology; While compromising the potential user and then charging double for it. I am sure the company asked some riders to test the helmet, but somehow that failed to show up the flaws. Or folks were not honest. Or the designers, engineers, or marketers refused/chose not to listen.

Customer service failure: I had a lengthy discussion with the companies' customer service manager His response was to assure me that the helmet was safe, it passed all the required tests. And none of the company's employees or the sponsored pro riders observed any problems with the helmet. The official did not recognize any my observations or my ability as a customer to have observations much less as an engineer and product design professor. They also said that no one else had any critical observations of the Spector. But a short search of existing product reviews substantiates my observations.

Other notable design failures

The cycling helmet is the example that got my attention. Over the years I have mentioned to several students that their group studio, product design could not function. But the group proceeded with the impossible design, why? Usually a bully dominated the group and pushed the bad idea through to completion. Whereas levelheaded groups tend to synergistically produce feasible products. The bad helmet was forced through by a subcontractor for the unmentioned company, rhymes with Wreck to get a piece of the MIPs market. But what other design markets are readily susceptible to design fraud and why? The why can usually be attributed to consumer reasoning being overruled by emotion. Examples include most luxury products like perfume, watches, jewelry, sports cars, and fashion. The cycling industry along with many other sports has a poser crowd that wants to be seen with the newest, best, most technical, most expensive products. Much like highly fashion minded folks. Which is also true for a lot of high-end furniture and buildings. Where function often is sacrificed for trendy appearances that appeal to the current foolish consumer. This is the focus of the ethical question as a design educator. What is our responsibility for protecting consumers and the environment? Or should we miss the opportunity to question fraudulent design, trendy design, design obsolescence, and consumer manipulation?

DESIGN ETHICS

The first step is to codify acceptable versus unacceptable practices. Then to run a test for product evaluation. Disclaimer; if someone is only designing for profit then ethics don't apply or apply on a hard to pin down, slippery slope.

1. Safety products: Any product with the function of protecting the user from harm should not be compromised for profit, sales, or cute design features. They can and should be attractive, easy to use, very ergonomic, affordable and so forth.

2. Compulsive shopper: This is a sleazy category of product design. These products are often located on end caps in retail stores and near checkout registers. Products that consumers did not intend to purchase but can't help themselves from adding to their cart during the boredom of waiting in the checkout line. Harmless items that usually don't cost much and can feed the shopaholics temporary endorphin high of one more purchase. Some obsessive-compulsive shoppers must have a drawer with a hundred fingernail clippers, a closet full of emergency flashlights, way too many batteries, and lots of fashion magazines. This category also covers the guilt purchase for Father's Day, when the big box hardware stores, fill the entry aisle with cheap, gimmicky tools, that no one really needs. The self-adjusting, universal wrench, The 101 complete tool kit, etc. This also happens worldwide for Valentine's day, Mother's day, Christmas, Easter, Ramadan, Hanukkah, Chinese New Year, and Indian Dewali.

3. Luxury products: This is even a more slippery slope. Some Luxury items, like sunglasses cost \$5 to produce and sell for \$200. That is a 39 times profit margin. Or a 4,000 percent markup. Some people like feeling special/elite owning and showing off expensive items. Other examples include perfume, watches, cars, jewelry, and almost anything that is shiny: also, mansions, trendy houses, furniture, antiques, wine, and a thousand other products but some of these are not the purview of design students just greedy marketers. Is this just or unjust, it was called the "brass rule" charge whatever you can. Also, the expression, "whatever the market will bear".

4. Prideful products: This category is similar to luxury, but slightly different. Products that appeal to the consumers vanity or feeling of belonging to a group or image. These products might seem innocent but can be bad for the environment. This leads into design obsolescence.

5. Design obsolescence is very unethical and should be criminal: I was doing course work for my Ph. D. along with a group of older learners from General Motors. We were deep into a discussion during a statics and probability course when one of the GM engineers stated that the design cap for GM products was 100,000 miles, and then clapped her mouth shut, and looked around guiltily at her coworkers. Plastic parts often deteriorate for lack of pennies worth of UV barrier. These failures ensure that another purchase is made. The loser is the consumer, but the real loser is the environment. The waste is inexcusable.

6. Harmful products: Harm to people, creatures, or the environment. The original purview of engineering was weapon development. But unlike Leonardo DaVinci, few modern-day engineers are also artists. Design by nature is creative and wonderful, therefor design for destruction is not design but an atrocity.

Ethics test example

Let us test the "Design code of ethics" with the ill designed cycling helmet. And score the aspects on a ten-point scale, thus creating a rubric example. The helmet was designed to make a profit. Nothing wrong with that except that it is a safety item with a 300 percent upcharge; 5 out of 10 for greed. The helmet is a safety item, but was compromised many ways to gimmick sales, and became

dysfunctional; 8 out of 10 for compulsion. 3 out of ten for safety function. The product was riding the trendy MIPS wave, get rid of the old bring in the new and improved, 3 out of 10 for trend chasing. Design obsolescence, 3 out of 10, retailers advise changing helmets much too much. Harmful product, 10 out of 10, can't shoot too many ducks with a helmet. That brings the score to 5+8+3+3+3+10 or 32 out of 60. It would be interesting to fine tune the ethics categories and perform this test on many products. This conceptual critique can be used to hopefully stimulate discussion and debate about design ethics.

CONCLUSION

I.E. the conclusion. Who's to blame when products emphatically fail? Perhaps no one person but a long series of minor contributions with each new phase of production allowing a little more failure to pass on. In the end the group of people deciding why a product failed are all pointing fingers at each other. No one would ever blame university administrators for the failure. The administration did their job, counting the beans, number of graduates, making sure accreditation is up to date, managing the budget, and so forth.

But, in truth, everyone is too blame for product failure. Just like everyone is to blame for global environmental decline. University administration should be insisting on long term tracking and evaluation of their graduates and adjusting current education with a feed-back-loop. They should be holding departments accountable and departments holding professors accountable. Instead the current trend is for administrators to specialize in earning the highest salary possible and hire subordinates to limit their workload. Departments just get by, whining about how unfair everything is from budget allocations to office size, instead of owning up to the responsibility of warranting competencies. Some professors really care and work hard to instill ethics and sound design practices, and lots of them don't get tenure. It is difficult to balance the fine line of being selfless for your students and leaping all the barriers that we put into our advancement and tenure requirements. Plainly stated, I, and most of my colleagues were, and are guilty of self-preservation and compromising our student's education for tenure and advancement. Yes, that means, the horrible bike helmet is my fault.

NOTES

1. P Rodgers and A Milton, Product Design (United Kingdom: Laurence King Publishing Ltd., 2011), 184-188.

2. Industrial Society of America, , Herndon, VA 20170, Copyright 2020, https://www.idsa.org/code-ethics

3. J Lesko, Industrial Design Materials and Manufacturing Guide (USA: John Wiley & Sons, 2008), 3-6.

4. A Tilley, The Measure of Man and Woman (USA: John Wiley & Sons, 2002), 35-43.

5. Eve O'Nieeill, "When was the last time you replaced your bike helmet," September 26, 2018, https://thewirecutter.com/blog/when-to-replace-your-bike-helmet

6. <u>Michelle Arthurs-Brennan</u>, "Best road bike helmets 2019: a buyer's guide to comfortable, lightweight and aero lids, June 26, 2019, <u>https://www.cyclingweekly.com/group-tests/best-bike-helmets-buyers-guide-146500</u>

7.Steve Rowson, Virgina Tech Helmet Ratings, Biomedical Engineering and Mechanics Copyright © 2018, <u>https://www.helmet.beam.vt.edu/bicycle-helmet-ratings.html</u>

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ELEMENTS OF CONTROL AND DEGREES OF FREEDOM IN THE NEW CIVIC SPACES OF THE CONTEMPORARY CITY

Author: PEDRO BENTO

Affiliation:

CIAUD, LISBON SCHOOL OF ARCHITECTURE, UNIVERSIDADE DE LISBOA, PORTGUAL

INTRODUCTION

Making a harsh criticism of the "purportedly" alienating role of the shopping and leisure centers that recently popped up in most of the urban regions where we live, several authors (Benjamin, Foucault, Sorkin, Koolhaas, Graca, and in particular, Nan Ellin in Architecture of Fear), describe the perverse effects that would fall on their users, arising from the behavioral induction or control mechanisms. The hypothesis that we develop aims at carrying out a deeper analysis of some of those typologies, from the perspective of assessing the validity of the previous criticism. Our starting hypothesis is exactly the contrary of those previously referred to, and it is as follows: the users value the feeling of security experienced in these spaces always and when that feeling of security is not jeopardized by excess. For the user, the quality of experiencing these places is greater, the greater the feeling of freedom he has. And such feeling of freedom increases or decreases as a result of two fundamental factors: the bigger or smaller number of physical elements of control in the same space, and a time factor - timetables for use. That is to say: a space closed by automatic doors, where the stores entrances are all marked by alarms, where video surveillance cameras exist, where security agents walk by, whose use is subject to a certain timetable, in principle, a more surveilled and controlled space, is a space of lesser freedom than another that is not always closed by automatic doors, where there do not exist as many factors of control, and that can be used during the day or at night. From this analysis, we conclude that at least two categories of spaces exist: spaces of maximum freedom and spaces of conditioned freedom.

LITERATURE REVIEW

According to Indovina, Choay, Pavia and Ramos, or more recently Graça, Portas, Domingues and Cabral, the contemporary city is a fragmented city, which tends to be disorderly, segregated, disused and hardly manageable. It is the denial of the city concept itself and rejects the potential that the urban environment can provide. According to Miguel Silva Graça "if to the evocation of public space, we associate an image of urbanity, however, its current relationship with the city is inaccurate. The current conception assumes and approves the metropolitan chaos and the city without a place."¹ An expansion model that privileges urbanization without city, segments and fractures the territory, atomizes social relations and eliminates public space from its priorities, builds specialized and isolated fabrics. This is the "generic city"² that manufactures pieces scattered throughout the territory

and assumes that "the best possible order will come out of chaos." ³ It is, according to Rem Koolhaas, the "city freed from the slavery of the center, from the straitjacket of identity (...) is the city without history." ⁴ It is the city that is built "through the evacuation of the public sphere." ⁵ It is the city where "the street died." ⁶ However, if the appropriation rates of public space are reduced, on the other hand, the high levels of intensity of use of collective spaces are increased, especially those referring to shopping centers. Thus, according to Graça an image of a city formed by isolated elements or buildings is affirmed. "A logic reinforced by the dynamics of urban planning of products, submission to the real estate market, the strength of private companies (...) the syntax of buildings-merchandise replaces the city of exchange and diversity."⁷

For Graça, "the shopping centers are today (...) one of the most visible manifestations of today's consumer society. Present in the centers and suburbs, from the largest European cities to the smallest, these commercial formulas tend to be an inevitable place for consumer activity for the majority of their urban users and, therefore, increasingly one of the key places in their daily life." ⁸ Also Nuno Portas in a reflection on the transformations of the contemporary urban space, and specifically on the lack of legibility of the extensive urban, said that "the basis of the structure of the urbanized territory is its Collective Space System."9 He recalled precisely the teachings of Kevin Lynch, Bollnow and Balmond on the importance of structure in the ordering of occupation and functioning of the territory, by promoting the creation of a mental map that allows understanding of the territory, its position with respect to it, as well as its appropriation. Then he explained that this system is the network that connects the various elements of the urban agglomeration and that it was constituted by the set of spaces that the subject travels and from which he reads and perceives the city. As he explained, while in the canonical city, public spaces tend to concentrate a set of meanings - since they simultaneously respond to questions of form, function and symbolic value (sign) - in the vast urban area, the coincidence of these meanings is difficult to find, since the daily routines of its inhabitants go through a set of spaces that respond to relatively recent models and programs and over which they have not yet had time to establish other valences and values. Thus, he adds that "Shopping centers, for example, began to associate diversified uses related to leisure and culture, and this brought with them socialization practices. They have become meeting places, urban references and even poles generating new centralities (A. Wall), such as Norteshopping in Matosinhos or Arrábida Shopping in V.N. Gaia."10

In short, loved by some and hated by others¹¹ the shopping center is one of the most controversial and prominent pieces of the contemporary urban landscape and has been one of the most controversial issues in the architectural and urban discussion of recent decades. However, it still does not find a clear enough answer about its role in the construction of the urban.

METHODOLOGY

Object of Study

The objects of study are the urban shopping centers and other leisure and consumption collective artifacts that, since around two decades ago, were deployed in the central cities of Lisbon and Barcelona. Rather than analyzing an extensive list of case studies, in a more or less superficially way, I decided to focus on only six case studies, yet, in an incisive and profound way. To select the case studies, I relied on two criteria – size and location. According to the typological criterion, the selected spaces should be representative of the different types of shopping and leisure centers that can be found. The size can vary from a small or medium size, to a large and very large dimension. According to the standards fixed by the International Council of Shopping Centers (ICSC), the commercial

centers of very large size, are those with more than 80,000 m2 of gross leasable area (GLA), the largescale shopping centers rank between 80,000 and 40.000m2 GLA, while medium or small size shopping centers are those of less than 40.000m2 GLA. As per their size, three case studies were selected in Lisbon and three in Barcelona – see Figure 1. According to this criterion (very large, large, medium or small size), I chose, respectively, Colombo Shopping Centre, Vasco da Gama Shopping Centre and Campo Pequeno shopping and leisure complex; In Barcelona, La Maquinista Shopping Centre, L'Illa Diagonal Shopping Centre and shopping and entertainment center Maremagnum.



Figure 1. Case Studies Framework. Source: (Author 2015)

Research Hypothesis

The approach put forward in this research aims at demonstrating that some of the newer shopping and leisure centers, emerged in the inner city, are playing a very important role in the construction of the contemporary central city - producing new collective spaces of gathering and stay, expanding the public sphere and generating new urbanities.

DISCUSSION

To exemplify the type of approach and analysis followed in the present investigation, we present the analysis carried out on the largest selected shopping centers - La Maquinista and Colombo. As you may observe in Figures 2 and 3, we start by identifying the existing control elements (Opening Doors - Green Line; Other Gates - Blue Line and Video Surveillance Cameras - Red Points) and then pointing out the Degrees of Freedom of each collective space of the artifacts (Maximum Freedom Spaces - Light Pink and Conditioned Freedom Spaces - Dark Pink).



Figure 2. La Maquinista Shopping Centre Analysis. Source: (Author 2015)

La Maquinista

In La Maquinista, video surveillance cameras are positioned at key points of the venue, so that they cover not only the collective interior spaces of the shopping center but also the immediate exteriors or those that touch the perimeter of the building. At least eleven cameras have been detected on the second floor, thirty-one on the first floor and twenty-six on the ground floor, totaling 68 cameras. The vast majority are located in the main access points to the facility and next to the most important vertical communication areas. The manual gates are located on the street or first floor, at the South and North entrances and at the three entrances that open on the República Dominicana street. The electric shutters are located on the lower floor, at the entrances that face toward the Ciutat d'Asunció street and North Plaza. The manual opening gates are made of folio, after opening they are placed one on top of the other and almost disappear; the electric blinds are embedded in the wall, they rise and fall like those of any urban commercial premises and after opening the limits between interior and exterior are extended. And the automatic opening doors isolate the corridors on the ground floor and from the street, which connect the collective spaces of the shopping center (Plaza Central, Plaza Norte and dels Trens Street) with the hypermarket.

In this case the control elements used to open and close the premises (gates, electric shutters and automatic doors) are very well hidden, so the limits between public space and collective space they are not immediately perceived by their users. This aspect is particularly important because it favours that relationship of natural continuity between the surrounding public spaces and the collective spaces generated with the shopping center. There is then, in the case of La Maquinista, a harmonious continuity between each other, throughout the day, only interrupted at night for a few hours.

Regarding the degrees of freedom, we can affirm that, with the exception of the North and South Plazas, all the other collective spaces of La Maquinista are of conditioned freedom, because they are subject to a specific schedule of use and specific rules of conduct. However, perhaps due to the open typology of the shopping center, the behavioral restrictions in this case are less than in other facilities. In La Maquinista it is not forbidden to smoke, take photos or videos and it is allowed to walk even with properly controlled pets. In the cases of the North and South Entrance places, freedom is total, because they are spaces not subject to a schedule of use, which can be accessed at any time, every day of the year. Finally, the spaces where our freedoms are most affected correspond to the aisles of the

hypermarket, on the lower floors and on the street. Although they are located inside the facility, they are closed by doors that separate them from the other collective spaces of the shopping center.



Figure 3. Colombo Shopping Center Analysis. Source: (Author 2015)

Colombo

In Colombo you can find all types of control elements. Doors with manual and automatic opening, at the entrances of the Western, Oriental, North and South lobbies. Metal gates, which separate the Entrance plaza from the Plaza de la Fuente and the Metro Lobby, video surveillance cameras and an important team of security agents.

The video surveillance cameras are distributed throughout the facility, forming a closed circuit for video surveillance. Six cameras on floor -1, in the entrance hallways of the shopping center; sixteen cameras on the ground floor, distributed by the vestibules of the Western, Eastern and South Entrance, along the shopping arcade, corridors and Plaza Central; seventeen cameras on the first floor, distributed by North entrance, corridors, Entrance and Central squares and shopping arcade and twenty-nine cameras on the second floor, also in all the important collective spaces and with a higher density in the more protagonist spaces of the floor - the garden, the food court and the cinema hall.

In the case of Colombo, it should be noted that the configuration of the artifact itself, its formal regularity and the isovision it provides, facilitate the control of the space by security agents, increasing on the one hand surveillance over users and decreasing on the other hand their individual liberties.

In the case of Colombo, freedom is conditioned in practically all collective spaces. The only points where this is not the case, and where therefore freedom is total, are the fountain square and respective exterior galleries and the North entrance area, or before the entrance in the North lobby at ground floor level. However, although the aforementioned galleries can be used by citizens who stroll down the street, they pass at about two meters high, above street level, distancing the collective space from public space and making it difficult to approach the citizen to the artifact.

As can be seen in the drawings, this shopping center is practically closed and there are no interesting lobbies that somehow make this delicate transition between public and private spaces. There are also no crossings that allow passage through the venue without directly entering its collective spaces.

The exception is configured by the entrance plaza, where the user is invited to tour an open collective space and then enter the closed collective space. However, even if it is open, this space is closed at night and it's subject to a specific timetable and behavioral guidelines. So during the period when the mall is closed the most important transition space disappears.



Figure 4. Degrees of Freedom Synthesis Framework. Source: (Author 2015)

CONCLUSION

After analyzing each case study – see Figure 4 - we can draw three concluding remarks. The first one is that the vast majority of collective spaces generated by artifacts of leisure and consumption are places where freedoms are conditioned. That is, they are places where the user is subject to established rules of conduct, where he is supervised and where he is limited to the use of the collective space within a certain time. In La Maquinista, of the ten collective spaces found, only two are of maximum freedom - the Plaza de Entrada Sur Sao Paulo and the Plaza de Entrada Norte Potosí - the remaining eight are of conditional freedom. In Colombo, only two of the 33 existing collective spaces are of maximum freedom - the Plaza de la Fuente and the North Vestibule. In the Vasco da Gama, only three of the eight collective spaces found - the eastern, western and station entrance halls - are spaces of maximum freedom and in the Campo Pequeno only the helical halls and the hall ramp are spaces of maximum freedom; the remaining and most important ones - the gallery, the food court, the corridors connecting to the food court, the circular corridor and the one connecting to the metro - are free. However, exceptions have also been found here. In the case of l'Illa Diagonal, five of the seven collective spaces discovered are spaces of maximum freedom and in the case of maximum freedom and in the case of maximum freedom and in the collective spaces of maximum freedom.

The second conclusion is that the size of the artifact seems to influence or determine the degree of freedom of its collective spaces. While a small-scale shopping center can only be watched by a small security team supported by a video surveillance system, a large-scale shopping center, although equipped with an important video surveillance system, always needs highly specialized security equipment or even several security teams, which represents a very high cost at the level of maintenance. In these cases, the search for an intermediate solution that would consist of having at least some spaces of free access, similar to the case of L'Illa, seems to be the most sensible and easiest solution to carry out.

Regarding the case studies analyzed, while Colombo and La Maquinista, both large centers, with 475,000m2 and 214,000m2 of Gross Building Area (GBA), have just two collective spaces with maximum freedom compared to thirty-three or ten collective spaces respectively, the Vasco da Gama,

a medium-sized artifact, with 160,000m2 of GBA, increases the number of spaces with maximum freedom to three out of a total of eight, and in the case of l'Illa, an artifact also of medium size, of about 197,400m2 of GBA, the spaces of maximum freedom exceed those of conditioned freedom. Finally, in the case of the Maremagnum, a small-scale leisure center, of about 59,000m2 of GBA, all the collective spaces are of maximum freedom.

The third conclusion that we can draw is that the typological difference of the facility - whether it is an open shopping center or a closed one - does not seem to affect the degrees of freedom of its collective spaces. Colombo, which obeys a type of closed shopping center, presents only two spaces of maximum freedom. And, its namesake, in Barcelona, La Maquinista, which responds to a type of open shopping center, presents the same number of maximum freedom collective spaces. Although there seems to be immediate continuity between the collective spaces of La Maquinista and the surrounding streets, the truth is that at night the venue is closed and its use is as limited as in the Lisbon shopping center.

NOTES

¹ Miguel Siva Graça, SHOPPING & CENTER: sobre o consumo, a cidade e os centros comerciais em Portugal e na Europa. (PhD diss., Universidad de Valladolid, 2010), 329.

² Rem Koolhaas, "The generic city," Domus, 791, 1997, 3-12.

³ Koolhaas, "generic city," 3-12.

⁴ Cf. *Ibidem.*

⁵ Cf. Ibidem.

6 Cf. Ibidem.

⁷ Cf. Graça, Shopping & Center, 329.

⁸ Cf. *Ibidem*.

⁹ Nuno Portas, Álvaro Domingues and João Cabral, *Políticas Urbanas II – Transformações, Regulação e Projectos*, (Lisboa: FCG and Porto: CEFA Universidade do Porto, 2011), 187.

¹⁰ Cf. Portas, Políticas Urbanas II, 190.

¹¹ Cabirio Cautela and Daniela Ostidich, eds. *Hell Paradise Shopping: L'Inferno e il Paradiso degli acqusti e del consumo*. (Milan: FrancoAngeli, 2009), 12.

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MOVING TOWARD A MINDFUL ARCHITECTURAL DESIGN; INTEGRATIVE HOUSING; HOME, WORK, WELLNESS

Author: ISUN A KAZERANI

Affiliation: M00-TION STUDIO, SWINBURNE UNIVERSITY, AUSTRALIA

INTRODUCTION

The concept of mindfulness has attracted considerable attention and been discussed and practiced in multiple disciplines. This concept emphasizes on the connection between mind body and soul and the awareness about the present moment for quieting the mind through synchronization of heart rate and breathing rate. Meditation, for instance is one of mindful methods, which allows looking into the living brain in action and slows down mental process. Despite the popularity and effectiveness of the concept and practices of mindfulness, it has less been discussed in the area of design and architecture. A closer look at the theory of architecture suggests that some of the scholars such as Bohm (2013) links themes of 'Atmosphere' to 'Mindful Physical Presence in Space'. He mentions that the revisit to human body has commenced during the nineteenth century kicked off by art historians such as Heinrich Wolfflin, arguing that architectural spaces are not only shaped by vision but rather the bodily presence and internal perception. Following that, August Schmrsow suggested a more scientific take of Wolffin's intuitive interpretation, which represents architecture separate from load-bearing properties but perceived by the movement of experiencing them.

In contemporary architectural theory and practice, the notion of mindfulness has been often associated with Zen architecture or specific typologies, such as the design of wellness studios and meditation centers. The conceptual direction of these works are mainly toward the relationship between human experience and the built environment with less study on the importance of mindfulness on human wellbeing. In fact, principals of health and wellbeing is often studied and practiced in the design of hospitals and medical clinic. This is while stress and anxiety is known to be the disease of the century and mindfulness techniques is said to be the most effective approach for stress reduction and improvement of life quality. Hence, my aim in this work is to raise the significance of mindfulness from the body, mind and spirit perspective in design beyond the walls of hospitals and in the places of everyday living.

Mindfulness and movement

Movement is one of the important Pillars of mindfulness; Movement connects the mind and body to the surrounding environment and creates balance between mind and body. Mindfulness brings awareness between moments of stillness and movement and connects the mind with the physical state of being (Verhaeghen 2017). Movement could be considered as any kind of Change in bodily

position and posture pace, such as walking or more dynamic or static actions. This could range from practices of yoga and meditation to more physically active exercises not as a trend in form of gym workouts but for mind and body health. Different methods of mindfulness, such as Body-based Intuitive Knowing (BBIK), are now clinically practiced. As Mills and Allen (2015) suggest, using movement such as walking, posture movement (such Yoga) and the awareness of body sensation to regulate arousal and stress levels. Movement and its different forms is in the center of Mindfulness-Based Stress Reduction program (MBSR) to induce a state of awareness (McComb 2015).

In the literature of architecture, the notion of movement is often considered as a formal attribute of the building or reduced to the notion of circulation and physical access. Hardy (2011) identifies two different types of movement, the 'represented' movement associated with the formal characteristics of the building that creates an illusion of movement and the 'contained', which is the movement of the eye, mind and the imagined body. In that sense it is a type of 'contained' movement but while not limited to the action of walking, it is engaged in physical movement of some sorts. Another examination of movement in design has been studied in elderly housing and in response to their limited physical capabilities. This is while the new findings in the filed of wellness and mindfulness shows the multitude of the benefits of movement for mental and physical wellbeing in different age groups. Research studies, including the Australian Health survey1 have long demonstrated the beneficial effects of Physical activity and movement on various conditions and diseases in bringing health benefits and improving life expectancy (2010).



Figure 1:Movement its different forms (from meditation to yoga and more strenuous activities) Image Source: https://www.mindbodygreen.com/movement/

DESIGNING FOR MINDFULNESS THROUGH MOVEMENT

The contemporary urban life has shifted people's lifestyle in relation to work, life and has impacted our mobility in the spaces of our living. The increase in the development of mid/high-density development has led to size restrictions and limited horizontal space, which has impacted people's physical movement. The survey results by the Department of Health in Australia shows that 2.6% of the total disease burden in Australia is due to physical inactivity (using 2011 data). The vertical growth of the urban environment has also negatively affected social interaction. Several studies such as Evans (2003) and Fanning (1967) indicate that women in high-rise housing experience more loneliness and less social contact with their neighbors and lack of access to a green area.

With the advancement of technology and recent crisis with human health and climatic condition, there has been an increasing interest in the phenomenon of working, particularly home-based styles (Francis 2017). While this form of worklife could save time and energy and adapt to new generation of flexible professional context (such as entreaupruners and start uppers), it has also affected the level

of mobility and social interaction and mental health (Gandini 2015). For instance the crisis with health condition and climate change, such as the current worldwide quarantine condition due to Covid #19 or the recent Australian bushfires has dictated the integration of our places of work, rest and life in our homes. Lack of sufficient physical movement is amplified in these scenarios and has consequently led to physical health condition and a sense of isolation (Brookfield al. 2015).

In response to such social and environmental shifts, I developed a project called "Integrative housing; Home, Work, Wellness" in 2018 proposing a mindful approach to encourage movement to improve physical and mental wellbeing as well as possibilities for social interaction. According to Holly et al. (2015) health and wellbeing is one of the important indicators of sustainability and hence, it could be argued that a mindful approach to the architectural space also leads to a sustainable lifestyle. The design follows users' movement to encourage moments of motion and stillness and particularly asks for responding to the needs of the contemporary lifestyle (Jarvis 2011); e.g. the incorporation of co-working spaces and mindful interior spaces for meditation and 'exercise from home' practices. As part of this project I have developed integrative design models in my design practice and run a master of architecture thesis studio. Below represents one of the developed design models under this theme in my practice at M00-tion studio for a micro-housing project as well as a couple of examples from the master of Architecture thesis design studio.

Dine-Amyc micro housing: An instance of mindful residential design

One of the design models, which I developed in response to the recent needs in the design of high-rise residential buildings for integration of work, life and wellness is the concept design of a micro-housing (Dine-Amyc), which probes the below scenario:

"What if we design an integrative high-riser, formed by peoples' movement to encourage physical dynamic and social interaction? The core structure of this residential building is a vertical ramp/walking trail, with pre-fabricated apartments placed on top of the ramp. The pattern of movement is repeated inside the apartments. This will look like sharing our 'backyards' with the public while being in our private space."



Figure 2 &3: Diagrams of the concept development: forming the structure of a high-rise building based on a vertical ramp informed by human movement and vertical movement of the horizontal planes. Original hand drawings (top), developed digital diagrams (bottom). Credit: M00-Tion studio The concept proposes a strategy for appreciation of space in a small-sized apartment, which incorporates new modes of work and lifestyle such as remote working or co-working in the design of the apartment units. The design of the vertical ramp offers a progressive understanding of the 'common space', where users get to meet their neighbors and the public in their everyday walking/jogging practices. Instead of the traditional modes of gym facilities in residential buildings, this concept encourages physical activity and acts as a transition space for lingering in-between the levels. The 'publicness' of the communal spaces also leads to a socially and physically healthier setting for the larger community. A fluid relationship between inside and outside apartment units and movement between the private and public areas also increase the possibility for social interaction.



Figure 4: Long section drawing, Credit: M00-Tion studio



Figure 5: Exterior perspective, Credit: M00-Tion studio

The vertical movement continues in the design of the interior of the apartment buildings in response to the shifts in the lifestyle pattern and new understanding of the 'function'. The conventional compartmentalisation of space into certain functions for sleeping, eating, working and recreation (Alfirević et al. 2016) does not respond to the more recent shift between work and life-styles. In small apartment units, movement becomes even more limited by strict distinction of conventional functions. Hence, the proposed design offers a vertical solution, where the user is given more freedom to actively move and creatively adapt the function to their own needs. The circulation becomes the transition space between different activities; it also becomes the space of functioning as well (e.g. is the workspace (Erik 2020) in between the kitchen and living room).





Figure 6 and 7: The ramp as a shared space for community activity(top), the slight slop of the ramp invites different users with different physical abilities; Axonometric drawing of the apartment buildings (bottom)



Figure 8 and 9: Renders of the interior; Workspace as a landing and transition floor between the kitchen and living room (top), bedroom located on top of the unit receiving maximum light and privacy (bottom), Credit: M00-Tion studio

Design studio examples

As part of this project, I also led a thesis studio for master of architecture program in 2019. The selected examples particularly look at the impact of fluidity and flexibility of the design layout, and the use of flexible furniture and fixtures in encouraging mindful movement. The incorporation of socially integrated co-working spaces is also another focus of the design. Other than a dynamic lifestyle that such setting requires, it encourages creativity and the idea of living with "less stuff" and leaving more room for a flexible setting. Yet, they consider the balance between the need for the resident's constant engagement with reconfiguration of the apartment and their ability to enjoy the space as it is.



FREEDOM OF MOVEMENT WONG KWAN WING,MASTER OF ARCHITECTURE PROGRAM Melbourne University



Figure 10 and 11: Flexible furniture and fixture and allocation of co-working spaces in the public area of the building (Top), Movable design elements including adjustable floor for meditation and yoga (bottom), Credit: Wong Kwan Wing and Nathan Coastall

The above work is another example of a mindful design with a focus on flexible fixture to encourage bodily motion for appropriating the space for different needs such as yoga and meditation. This perspective uses movement as a strategy for creating awareness about the presence of mind and body in a small sized apartment. It also highlights the significance of cultural rituals and social interaction. The design examples demonstrate the efficiency of this strategy for a flexible design of the interiors for different functions, regardless of their sizes. Changing our perception of the apartment 'size' could help to find potentials for physical movement in small-size apartments.

CONCLUSION

This work aims to highlight the importance of design for mindful spaces through the strategy of looking at human movement. Considering the recent shift in the way we live, work and spend our free time in contemporary society, it is important to rethink design models that adapt to these recent shifts. This is particularly important considering the recent crisis in environmental and health condition of the world, which imposes the use of home as a place for living, resting, working and nurturing of

mind and body. The illustrated design project proposed one of the models of "Integrative housing; Home, work, Wellness" project, developed by the author. The design explores possibilities for rethinking structure as a method for encouraging movement in the private spaces of apartment building and the public space of the vertical ramp to encourage different forms of physical movement, mental wellbeing and social interaction. The examples selected from the design studio project also demonstrated the importance appreciating space and the role of intelligent design in creating flexible interior setting that make the most of the size and encourages different bodily engagement with the setting. Overall, this article invites architecture and design academics and practitioners to take advantage of design possibilities for improving people's movement and mindfulness through looking at the recent shifts in work, life and wellness patterns.

NOTES

¹ ABS data, Australian Government report: According to the source, disease burden due to physical inactivity in the population could be reduced by approximately 13%, through 15 minutes of brisk walking for five days each week. <u>http://www.abs.gov.au/ausstats/abs%40.nsf/Lookup/4364.0.55.004Glossary12011-12</u>

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THE QUALITY OF WORK ENVIRONMENTS FOR EARLY CHILDHOOD EDUCATORS' WELL-BEING: AN INTERDISCIPLINARY APPROACH

Authors:

MIA KILE, NATALIE ELLIS, KYONG-AH KWON, KEN RANDALL, TIMOTHY FORD, ADRIEN MALEK

Affiliation:

UNIVERSITY OF OKLAHOMA (NORMAN CAMPUS), UNIVERSITY OF OKLAHOMA (TULSA CAMPUS), USA

BACKGROUND

Over the last five years, studies have raised concerns about the physical and psychosocial health risks among early care and education (ECE) teachers.¹ Approximately two million adults tend to nearly ten million children aged birth to five in the United States.² Considering this, the ECE workforce is experiencing a shortage in qualified teachers which can be attributed to low wages, highly stressful working conditions, and inadequate physical environments to support the needs of the teachers³ To deliver quality education and to provide positive experiences for children, teachers need a multitude of essential tools to be effective.

Although there are studies which consider the psychological well-being of early childhood teachers, there is a gap in the literature related to their physical health and well-being. Given that teachers overall well-being is multifaceted, to fully understand this phenomenon, research should be inclusive of potential predictors (e.g., workplace climate, instrumental support) and consequences (e.g., teacher turnover, classroom practice) of early childhood teachers' well-being and assess the influence of the quality of the physical environment.

This interdisciplinary study takes a holistic approach to understanding and addressing complex workforce issues by integrating data, techniques, tools, perspectives, and concepts of well-being from the specialized professions of early childhood education, physical therapy, interior design, and public health.

Study Overview

The study provides in-depth understanding of the phenomena centering on ECE teachers' well-being. Distinguished by both qualitative and quantitative methods, concurrent triangulation was used to confirm, cross-validate, and corroborate findings from data that was collected in two phases. Phase one data collection was obtained through surveys and health assessments of 262 teachers from 38 ECE centers in the Midwestern United States regarding their background, well-being, and workplace support. From this group, 40 teachers from ten centers were randomly selected to participate in phase two which consisted of direct observations (teacher-child interactions), assessment of physical tasks

and environments, and individual interviews with teachers and administrators about their well-being and needed support. The data revealed numerous concerns related to teachers' well-being and factors that may attribute to unhealthy work behaviors and psychological well-being of the teachers. The research provides valuable outcomes and insights from the study which propose to facilitate the support of ECE teachers' well-being and to improve the quality of their work environment which may lead to improved health and happiness of teachers.

Direct Link of Physical Working Conditions with Whole Teacher Well-Being

Existing literature supports the importance of teachers' working conditions in terms of job demands and supports not only for teachers' professional well-being, but also for their psychological and physical well-being (considered as whole teacher well-being). In particular, the quality of physical environment and various ergonomic factors in any workplace (e.g., air quality, noise pollution, lighting levels, furniture, and materials) may also have an impact on employees' well-being. However, this important element of working conditions has rarely been explored in the current literature. The current study investigated these multiple aspects of teachers' working conditions that include instrumental supports (compensation and benefits), work climate, physical capacity and demands, and factors related to the physical environment. This paper focuses on the contributions of the interior environment to support the overall well-being of the teachers.

METHODOLOGY

Participants

The study consisted of 262 teachers from 38 early childhood education centers in and around Tulsa, Oklahoma. The teachers', nearly all women, ages ranged from 18 to 66 years (M=37) and were from diverse racial and ethnic backgrounds (56% Caucasian, 22% African American, 10% Native American, and 7% Hispanic). The participants held full-time teaching positions at their respective centers and included infant toddler and preschool teachers (60% infant/toddler teachers) and lead and assistant teachers (61% lead teachers). Teachers working in Early Head Start/Head Start programs comprised 43% of the cohort. Additionally, 44% of the teachers have an associate degree or some college while 40% hold a bachelor's degree or higher. Study participant's experience in early childhood education ranged from less than a year to 40 years (M = 11.86 years).

Procedure

Following institutional review board approval, teachers were invited to participate in this research after their center administrators agreed to engage in the study. In the two-phase process, information was first gathered through packet distribution which included consent forms and questionnaires to each participating center. Teachers at each center who completed the surveys were eligible to complete phase two of the study. Ten centers from phase one were randomly selected to participate in phase two and four participants were randomly selected from those who completed the initial survey. Phase two consisted of one-on-one and group interviews, multiple observations, and physical health, ergonomic, and environmental assessments. All participating teachers received a small compensation for their time and contribution.

Measures

Given the multifaceted aspect of the project, several modified and combined measures were collected to gain a holistic understanding of the contributing factors for overall teacher health and well-being. Measures which directly reflect workplace support (physical environment), physical well-being, and psychological well-being (job stress and personal stress) contributions to the teacher's overall health and well-being were explored.

Physical Environment- Environmental Preference Index (EPI)

The Environmental Preference Index (EPI) is an index designed to measure environmental preferences for a person working in an interior setting. The tool seeks to serve as a reference point for bridging user needs and the design practitioners' ability to meet these needs effectively through a collaborative experience. The EPI endeavors to measure the environmental preference for a worker in their workspace and create enhanced alignment for everyone involved. The original EPI constructs are the physical built setting, the furniture in the setting, and the psychological constructs of control and culture, along with the setting's conveniences (amenities).

Due to the type, size, and scope of the project, the index was abbreviated to only measure three of the four primary constructs by combining the constructs of the physical environment and culture into one. Additionally, the construct of amenities was deleted to allow for understanding of operational policies and their impact on teachers. The physical facility construct studies the summation of the built physical spaces. Adding cultural context to the construct allowed the researchers to explore built environment congruency with the center's mission and culture. The furniture construct considers all furniture in the space and how the components accommodate the people who use it; in the case of the early childhood center, the research sought to better understand congruent task alignment for the teachers. The psychological aspect of control considers the manner that light, noise, and odors can be controlled by the teachers in their classroom. Finally, the operations construct contemplated the ways in which the center is easy to navigate and that there are clear understandings of operations and responsibilities.

Phase two observational studies of the environment were conducted using the EPI as a comparison between phase one participant's perception and the practicing professional's observation.

Physical Environment- Indoor Environmental Quality (IEQ)

Documentation of lighting, temperature and humidity, and sound levels were recorded during the second phase in two sessions (morning and afternoon) using calibrated measurement equipment. Findings were compared to current standards and recommendations set by the American National Standard Institute (ANSI), American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), the Center for Disease Control (CDC), and the Illuminating Engineering Society (IES).

OUTCOMES

During phase one, the teachers completed a survey describing their work conditions, health and wellbeing and the center's physical conditions along with providing their preference and assessment for the different EPI constructs. The data indicated that 34% of teachers were often stressed on the job, 23% experience depression, 66% reported at least one workplace related ergonomic pain, 54% were below average in cardiorespiratory fitness and 75% were overweight.

The qualitative data that was collected in phase two consisted of semi-structured interviews, ergonomic assessment using the Rapid Entire Body Assessment (REBA), EPI assessment, and indoor

environmental quality (IEQ) measurements which provided an accurate assessment of current working conditions, and overall health and well-being from the perspective of the researcher/interior design practitioner.

Environmental Preferences Contributions

Although there were facilities that accommodated the adult teachers' personal needs, in many instances, these contributions were minimal, far away from a classroom, and only served toward accommodating the building's life safety code requirements. While the teachers didn't view these minimal provisions as an issue with the present provisions or strategies, the interior design practitioner/researcher observed incongruency that would contribute adversely to employment satisfaction as evidenced with the two largest variations in personal belonging storage and areas for relaxing and planning (see figure 1).



Figure 1. Lack of personal storage and places to relax and plan

There were rare occasions when adult sized seating and adjustable furniture was provided in the classrooms. Additionally, furniture for relaxing and planning was often cluttered and served multiple purposes. Most often teachers either sat on furniture scaled for infants and toddlers or simply sat on the floor (see figure 2).



Figure 2. Lack of Adult Size Furniture to Support Teacher's
All rooms that were observed had their own independent on/off light switching. The teachers created their own lighting scenes to accommodate nap time. This was achieved using strung lighting, small table lamps or in some cases, turning off all lights completely. The operational construct was often easy to observe and found to meet the center's code needs.

Overall, the teachers rated their environment higher than did the outside interior design practitioner /researcher (see figure 3). The largest variances were found to be in the physical facility and furniture constructs. Observational congruency with the respondent's ratings were found among the constructs of control and operations. To create enhanced congruency, environmental adaptations would be to provide classrooms with height adjustable tables (can be used for teachers and children) and teachers with adult scaled ergonomic seating. Steps to control congruency would be to consider adding dimmable ambient lighting.



Figure 3. Environmental Preferences and Importance from EPI

Indoor Environmental Quality (IEQ) Contributions

Poor IEQ can lead to sick building syndrome resulting in headaches, throat and eye irritation, decrease in productivity, increased absenteeism, and diminished worker satisfaction.⁴ For this study, data were collected through observations and instrumentation measurements of lighting, acoustics, temperature, and humidity with the results compared to industry standards for acceptable levels. The measurements were taken during two different times of the day (morning, and at nap time) for each location between the months of March and April during moderate weather conditions. The time of year is important in the contributions to natural daylighting, air quality (e.g., temperature, humidity, pollutants), and ambient noise level (e.g., lawn mowers, mechanical air handlers).

Lighting



Figure 4. Lighting control-natural daylight and views

Lighting is an important component in the built environment. Research has shown that quality lighting improves worker productivity and an increase in performance offset the cost of the lighting system⁵. In this study light meter readings were taken at two different times (morning, and in the afternoon children's nap time) to determine if the lighting levels fell within the recommended levels set by the Illuminating Engineering Society (IES). Also documented was the ability to control lighting within the space. This opportunity could be through the control of natural light entering the classroom through windows or skylights as well as easy access to switches and /or dimmers to control electric lighting.

The assessment revealed that many classrooms provided options for teachers to control the lighting using window coverings, shading devices, and on/off switches. However, some classroom settings provided limited control which left the teachers to devise their own ways to control lighting within the space which were not optimal for overall well-being as they blocked visual access to the outside (see figure 4). Other rooms covered lamps with colored film to diffuse the harsh lighting (see figure 5).



Figure 5. Lighting control-colored film

In one case, the classroom had no direct access to natural daylighting and the ambient lighting was turned off with the only lighting was provided by floor lamps, table lamps, and string lighting (see figure 6).



Figure 6. Lighting control-no natural daylight and views, poor ambient lighting conditions

While the average light levels fell within the recommended IES lighting ranges for most classrooms, there were extreme low and high levels in some classrooms contribute to eye strain for the teachers and cause headaches over time. Lighting can also affect the student's ability to perform which can contribute to stressful situations for the teachers.

Acoustics

IEQ studies reveal that 25%-30% of what is said in classrooms are not clearly understood by students related to acoustics.⁶ Prolonged exposure to loud sounds and certain noises can cause stress, raise blood pressure and heart rate. Research also indicates that even intermittent exposure to loud noises can lead to higher stress hormone levels and hypertension.⁷ The assessment of classrooms found sound levels exceeded the recommend levels for classroom settings according to the American National Standard Acoustical Performance Criteria (see figure 7). The researchers observed open floorplan configurations which join two classrooms experienced higher nap time disturbances than individual classrooms. The surveys also supported the notion that noise was a concern for teachers.

5	Acoustic (Sou	nd) Levels	
(measured in Decibel)			
	Morning	Nap Time	
Low	54.80db	44.35db	
High	73.85db	69.85db	
Mean	64.33db	55.91db	
*Recommended Level 35db-40db			

Environmental Considerations



*American National Standard Acoustical Performance Criteria (ANSI) S12.60

Figure 7. Acoustic Levels

Temperature and Humidity

Temperature and relative humidity measurements are often collected as part of an IEQ assessment because these parameters affect the perception of comfort in an indoor environment.⁸ The perception

of thermal comfort is related to one's metabolic heat production, the transfer of heat to the environment, physiological adjustments, and body temperature. Heat transfer from the body to the environment is influenced by factors such as temperature, humidity, air movement, personal activities, and clothing.

The study monitored temperature and humidity levels and found that most classrooms fell within the recommended levels for temperature and relative humidity (see figure 8).

Temperature Levels			
(measured in Fahrenheit)			
	Morning	Nap Time	
Low	67.48°	67.10°	
High	73°	74.9°	
Mean	70.37°	71.04°	
*Recommended in Winter		68.5°- 75°	
*Recommended in Summer		75°- 80.5°	

Humidity Levels				
(dry bulb method)				
	Morning	Nap Time		
Low	7.0%	6.7%		
High	46.0%	61.0%		
Mean	25%	25%		
*Recommended no greater than 65%				

*Per ANSI/ ASHRAE 55-2017 Thermal Environmental Conditions for Human Occupancy

Figure 8. Environmental Conditions

While humidity was within the recommended range, it should be noted that the Center for Disease Control (CDC) recommends humidity levels no greater than 50% as microbial growth (fungal, mold, and bacteria) can occur which may cause upper respiratory issues. The CDC also notes that too little humidity (dry air) can irritate sinus cavities, eyes, and the throat.

During observational studies conducted at the same time temperature and humidity levels were being assessed, it was recognized that older facilities which had operable windows had the windows open in the morning which may have contributed to higher humidity levels in the rooms. It also contributed to higher noise level readings from outdoor traffic and lawn maintenance. It should also be noted that this study was conducted during a one-month duration in which the weather was temperate. A longer study is needed to capture summer and winter months to gain a full assessment of the conditions across the year.

CONCLUSION

The study's results propose ways to support ECE teachers' well-being and to improve the quality of their work environment. The study identified aspects within the physical built environment which would support teacher health and well-being and recommend the centers provide: 1) furniture for teachers to support ergonomic needs 2) flexible lighting controls within the classroom (dimmable and task lighting); 3) private enclosed classrooms (not part of another classroom or building space; 4) areas for relaxation and respite; 5) space for personal belongings and storage; 6) an area outside the classroom for acoustical privacy (e.g. phone conversations); 7) noise control; and 8) nurse's office for sick children. These changes/alternatives may lead to improved health and happiness of teachers.

Additionally, the study discovered that a substantial number of ECE teachers experience physical (e.g., ergonomics pains, work-related injuries) and psychological (e.g., stress, depression) well-being-related issues and their work environment is not always supportive.

The consequences of poor teacher well-being are immense. Disequilibrium of resources and demands manifests as: 1) increased burnout; 2) lower satisfaction (dissatisfaction)/motivation; 3)low commitment to job and school; 4) increased teacher absences; 5) poor teacher performance/productivity; 6) poor school climate/strained relationships with co-workers; 7) thoughts of quitting (intent to leave); 8) actual turnover which can be costly to replace and retain.

These findings suggest improvements that can be made to better support early childhood teachers' through the physical environment's alignment. Creating these opportunities contribute to the children that are being served. The children are our future and making sure they have the best care through support of their educators is of utmost global importance.

FUTURE CONSIDERATIONS

The interior design researchers understand the importance of evidence-based design to inform meaningful design considerations which support the function of interior environments as well as support the occupants of said environments. With ever-developing circumstances, continuous reflection and measurement are needed to further enhance our environments. It is the goal to conduct a thoroughgoing analysis over the course of a year to fully understand contributing factors which effect the overall health and well-being for teachers with consideration for changing climate, seasonal demands, and the impacts on indoor environmental quality and overall teacher's well-being.

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EXPERIENCE-BASED CARTOGRAPHY: OBSERVATIONS ON THE ECOLOGY OF MENTAL HEALTH

Authors:

KORNELIA DIMITROVA, JULIETTE BEKKERING, TORSTEN SCHRÖDER

Affiliation:

EINDHOVEN UNIVERSITY OF TECHNOLOGY, NETHERLANDS

INTRODUCTION

This paper is based on a speculative architectural research project at the Faculty of Built Environment at the Eindhoven University of Technology, commissioned by GGz De Grote Beek. The long-term objective of this project is to generate a set of speculative architectural scenarios, which reveal pathways for the Estate De Grote Beek to transform as a sustainable, healing environment. In specific, this paper is a reflection on the 56 maps elaborated by the author during the site analysis phase. The maps are geared towards unpacking the notions of "sustainability" and "healing environment" in the context of the Estate. This experience-based cartography helped identify the challenges and specific design targets for transforming the site into a sustainable, healing environment.

Since the 1960s, the intersection between mental and environmental health has been meticulously studied within the domain of environmental psychology, bringing to attention the way people perceive and act upon their environments, and how these environments affect the people's behaviour. Typically, such studies rely on methodologies from psychology in combination with methodologies from architecture and geography.¹ This paper strives to build on the existing knowledge about the relationship between the environment and human psychology. This is done in the context of a speculative architecture research on the sustainable transformation of the Estate De Grote Beek, one of the largest mental health institutions in the Netherlands, with 13000 clients, 2000 staff, inhabiting a site of 117hA. Perception, behaviour and maintenance are strong ecological agents in such large mental healthcare institutions. The 56 maps visualise the ground conditions through four perceptive categories: landscape, the clients that inhabit it, the institution that governs it and the author's interpretation of their interconnectedness. This paper zooms in on three thematic pairs: Landscaping and Behaviour, Landmarks and Healing, and Fragmentation and Fear. Conclusions are drawn on the intertwined conditions of mental and environmental health in urban green areas and mental healthcare institutions, comparable to the Estate De Grote Beek.

METHODOLOGY

This analysis focuses on the intersection between physical interventions in the landscape and experienced phenomena. This intersection is documented through experience-based cartography, structured in four categories of maps: environmental, institutional, perceived and interpreted. This cartographic method is based on a combination of bibliographic research and interviews with key stakeholders of the Grote Beek. During the interviews the knowledge shared by the stakeholders was

documented in notes and in an exercise of annotating and sketching over a printout of a black line topographic map of the site. Following this, the author translated these annotations into thematic digital maps. Each category explores the unique perspective of the landscape, the institution, the patients and the author.

The environmental perspective is informed by topographic data of the area and interviews with Peter Gielen (Outdoor Activity Manager) and Rob Lammers (Centre Manager and Management Advisor); the maps visualise topics such as biodiversity, soil, water, and ground surface. The institutional perspective is informed by interviews with Rien Castelijns (Real Estate manager and Treasurer), Janneke van Kessel (Team leader daily activities and operative in Sustainability Certification) and Eric Irausquin (Chief of Security for Estate De Grote Beek), as well as by the strategic development plan, among other internal documents; the topics in focus are the value and condition of the real estate, departments distribution, and zoning, laws and regulations. The clients' perspective is informed by an interview with Eri van den Broek and Ian Havinga (members of the clients' council of GGz Eindhoven) and a survey of 13 clients; this category visualises the way the clients experience and perceive the site, the places they like, fear or find purpose in, and the problems they encounter.

The author's perspective is informed by metadata, interpretation and intuition. This category contains interpretations of the site workings, borrowing the logics of concepts such as the Ungers' Green Archipelago, the ecological effect of reintroducing wolves in the Yellowstone park, Jackson's Vernacular and Political Landscapes, among others.^{2 3 4} More importantly, the author's interpretation built on these logics by accounting for the stakeholder perception and experience. This category reveals alternative operative histories of the site, which give new and coherent meaning to the interrelation between landscape, institution, and clients, and therefore can show new pathways for the site currently lacks a coherent overarching vision that is able to address and accommodate its diversity of actors and qualities.

LANDSCAPING AND BEHAVIOUR: A MATTER OF CONTROL

Due to new regulations in 1993, the fences were taken down rendering the site accessible to the public.⁵ The institution's full control over people's behaviour transitioned to a partial control, distributed as a gradient. In 2019, the institution is relying on a combination of surveillance and landscaping interventions as a means of guiding behaviour. Despite these efforts, in some areas the park users sometimes engage in undesirable, disturbing or illegal activities. This gradient of active control results in two relationships between behaviour and landscape. Where control over behaviour can be established the landscape is made wilder and diverse. In areas, where behaviour cannot be influenced through institutional means, the landscape is to be made tame and accessible.

Due to surveillance and social presence, around the three clusters of buildings, where behaviour control has been established to satisfactory levels, so this triggers the institution to reduce control over the landscape. There, the lawns are cut less frequently letting the fields grow taller and more diverse in species. This makes them less accessible for walks but more attractive as nesting grounds for birds. This opens the possibility to reduce expenditure through landscape management, while also opening the opportunity to improve biodiversity, and thus re-wilding the park.⁶



Figure 8. Extent and types of landscape maintenance

Due to nature conservation laws and low accessibility, behaviour control is unattainable in the forests. Currently, traces of unwanted behaviours such as prostitution and drug use can be found in some forests. Control or patrol in this area would be too costly might result in a whack-a-mole game between the security guards and the perpetrators, additionally it might disturb biodiversity.⁷ The institution's intended solution is programming the landscape, so that it incites desirable behaviours in the visitors. This translates to tactics, such as routing and water management, which improve accessibility and channels the movement, and adding small recreation pavilions, which encourage desirable activities.



Figure 9. Gradient of control over behaviour of park users. (Dark - More control; Light - Less control)

LANDMARKS AND HEALING: THE EVOLUTION OF A HIERARCHY

The amelioration of mental health is the central focus of all activities and operations at the Estate De Grote Beek. The healing process happens in stages, taking place across several locations and departments. At each stage the clients regain independence and access to new activities and facilities. Due to their therapeutic significance, some locations become landmarks of the client community.

The art forest is located in the northern part of the site, where outdoor therapeutic activities take place, and more importantly where the clients regain independence.⁸ There the art and crafts works are made using found objects in the forest. This evolved as an activity that takes place in the forest itself and not only in the workshops, generating a series of larger art objects, created over a long period of time, and permanently on display. These objects and the experiences they generated now act as landmarks of the mental healing process, which the institution and the clients proudly show to visitors. These are landmarks produced by the healing process during their healing process.

Similarly, the institution gives landmark treatment to places, which it finds important the way it enables the personal and economic development of the clients. Here it is useful to look at the Bed and Breakfast and the Ketelhuis, these are places which were re-structured to accommodate workforce from the client community. In this way landmark creation is intended as a fuel to the healing process because it states publicly, visibly and structurally that healing through client empowerment happens there.⁹ Here, representation seems to be intentional, and brings to effect new spaces of healing and regaining independence. This independence is in the form of employment and income opportunities, as opposed to self-expression as in the art forest.



Figure 10. Migration of patients. (1-intake/crisis; 2-stabilisation; 3-socialisation; 4-integration)



Figure 11. Places of confinement and of regaining independence (A, B, C D – confined and crisis units)

FRAGMENTATION AND FEAR: THE MATERIALISATION OF BORDERS

Beyond barriers and fences, fear and disturbance can fragmentate the way a landscape is perceived. As physical and non-physical barriers appear, some parts of the park become inaccessible, and thus begin to disappear from the daily routines and experiences of the clients and visitors of De Grote Beek.

The 150 kV powerline that passes adjacent to the southern edge of the historical core is a visible barrier, even though it does not physically prevent passage. Some of the more vulnerable clients are afraid to walk under it, making the southern park areas virtually inaccessible to that group.¹⁰ The psychological effect of the 150 kV powerline in combination with the reduced social presence, seems to strengthen the perception that the southern area is dangerous and disturbing. In this way, perceived threats can materialise barriers and fragmentations.

Clients of the forensic care facility in the north (TBS) are often stigmatised and perceived as dangerous. This presents an invisible barrier that causes site fragmentation. Some of these clients have a permission to exit the facility to join outdoor activities. This is a reason why both park visitors and other clients avoid visiting this area.¹¹ Thus, the TBS facility generates a strong mental fragmentation of the physical environment. As this area remains desolated, for some this creates the opportunity to squat and camp. This increases the perceived fear and further solidifies the fragmentation.

Overall perceived disturbance plays a strong ecologic role. For instance, socially disturbing presence decreases the recreational use of the southern area of the park, which might eventually have a positive effect on biodiversity. This represents the site' variation of fear-driven ecology, as exemplified by the Yellowstone park.¹² These dynamics reveal why the processes described in Landscaping and Behaviour are not applicable throughout the site. Especially in places, where surveillance seems both uneconomical and unecological, as street lights and cameras bring expenditures in installation and maintenance but might also disturb the animals at night.¹³ In recent years the institution has been looking for tactics of how to influence behaviour in such areas, but so far has only resorted to forest maintenance.¹⁴



Figure 13. Fear and Disturbance (Noise, high speed transport, 150kV powerline)

REFLECTION ON THE ECOLOGY OF MENTAL HEALTH

The three pairs reviewed in this paper offer some lessons of how the ecology of mental health works in Estate De Grote Beek. Organising the terrain into meaningful areas, is not only a matter of physical conditions, but depends strongly on psychological conditions and experiences. The pairs affect the site's structure along these aspects: the formation of meaningful areas, the emergence of landmarks and the demarcation of borders. This somewhat reflects the relationship of the vernacular and political landscapes defined by JB Jackson.¹⁵

People's experience of the landscape generates wanted and unwanted behaviours. The institution reacts by changing the maintenance patterns of the landscape. In turn, the users might change their perception of the place, which might change their behaviour. Amidst this, the institution is continuously striving for an equilibrium as this ecosystem is also affected by a broad range of factors, such as birds' nesting habits, legal frameworks, urban biodiversity agendas, financial constraints, sustainability requirements, drought, among many others.

Amelioration of mental health is the central activity of the site and naturally it loads the importance of places, these hierarchies translate themselves into increased social presence, careful maintenance. Yet it is also visible that the clients and the institution might have a contradicting definition of what the important places are. The site's double role as an urban park and a mental health facility exacerbates some of the challenges. Phenomena such as Powerlines, illegal activities or draught, gain a stronger and more tangible effect on people's behaviour. This comes to play in the site's fragmentation and patterns of use, the reduced social presence can accommodate illegal activities, but it makes the landscape more readily available for urban wildlife.

CONCLUSION

This paper explores the mechanisms of three thematic pairs in the context of De Grote Beek. "Landscaping and Behaviour" exposes how landscape maintenance affects perception, perception affects behaviour, and behaviour affects landscape quality, testifying to the institution's continuous strive of equilibrium in the ecosystem. "Landmarks and Healing" traces how the therapeutic process generates symbolic places, and vice versa, revealing therapy as a major driving force in the establishing of hierarchies. "Fragmentation and Fear" outlines how visible and invisible structures fragmentate the site and affect patterns of movement, attesting to the environmental impact of perception.

While this cartographic method was developed through this specific site, it attempts to excavate an ecology of mental health, revolving around the perspectives of mental and environmental actors, qualities and conditions. This paper presents the three major entwined pairs observed in De Grote Beek. The experience-based cartography should be seen as a tool for reading landscapes through their complexity of material and immaterial dimensions. By curating the selection of themes and perspectives this method could potential be adapted for a range of societal challenges. This allows the overlaying of a broad range of perspectives (organisational, human, non-human) and the generating of new readings of a site, which in turn can be used as the foundation to create new stories and shared future scenarios. In a true spirit of sustainability, this method aspires to generate ways of hearing the quietest of voices, and a way of witnessing the smallest of events, so that we can design while hearing the full orchestra of actors.

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NOTES

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⁷ Eric Irausquin, On the security risks and crime, and the interaction between the forensic clinic clients and security guards, interview by author (18 June, 2019).

⁸ Peter Gielen (23 May, 2019).

⁹ Peter Gielen (23 May, 2019); Rien Castelijns, *On the realised and planned real estate interventions,* interview by author (8 February 2019).

¹⁰ Eri van den Broek and Ian Havinga, *On the experience of clients in Estate De Grote Beek*, interview by author (26 August, 2019).

¹¹ Ibid.

¹² "A rewilding triumph: wolves help to reverse Yellowstone degradation," Randall, Cassidy.

¹³ Peter Gielen (23 May, 2019); Eric Irausquin (18 June, 2019).

¹⁴ Peter Gielen (23 May, 2019); Rien Castelijns (8 February 2019).

¹⁵ John Brinckerhoff Jackson (1984).

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