

Designing Happiness: Capitalizing on Nature's Restorative Qualities

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ABSTRACT: Scientific studies exploring the environmental and experiential elements that help boost human happiness have become a significant body of expanding work. A wide variety of studies from both neuroscience and environmental psychology have recorded the restorative quality of the natural environment, noting both positive impacts on overall mental health, and strong correlations with self-reported happiness. This paper extracts insights on the impacts of social interaction, access, surprise, light, and beauty on happiness then extrapolates design principles and strategies to use in creating built environments that promote greater well-being. A virtual test case, drawn from a Master of Architecture thesis, is used to demonstrate possible ways these selected principles and design strategies can connect people to nature, with the intent to inform a science-backed approach to creating truly happy places. It is anticipated that these tactics will be useful to architects, planners, and urban designers as they endeavor to design positive user experience into form and place. To the best of our knowledge, many of these principles have not yet been tested and measured in real-world conditions. Potential future development would be collaboration with neuroscientists and environmental psychologists for examining post-occupancy testing of user experience in built environments.

KEYWORDS: Nature, Access, Happiness, Design

INTRODUCTION

This research leaps from the science of happiness found in a literature review to design strategies for universal application in architectural, planning, and urban design practice. It then applies those strategies to a virtual test case set in Baltimore City. Although there is still much to learn about how built environments impact people's emotional lives, much can be extrapolated now by combining ideas from different research disciplines. The work can continue to be enhanced and refined by collaborating with neuroscientists and environmental psychologists to test and study the impact of these principles and strategies as they are applied in real-world projects.

1.0 OUR LIVES ARE SHAPED BY THE SHAPES IN WHICH WE LIVE OUR LIVES

1.1. Need for Intervention

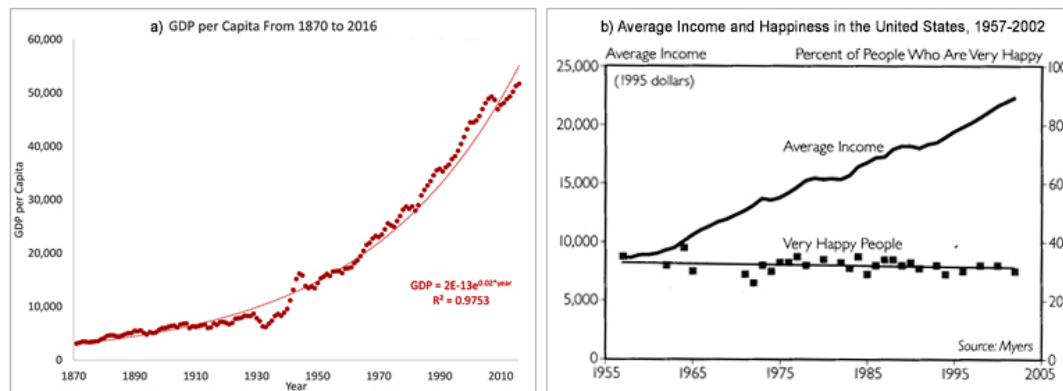


Figure 1: Growth in income over the last century has not led to equivalent growth in happiness; a) US GDP per Capita 1870 to 2016. Data Source: (Johnston 2018); b) Average Income and Happiness in the US. Source: (Speth 2005)

The United States (US) has experienced exponential growth in our gross domestic product (GDP) over the last century, but that growth in wealth has not resulted in the equivalent growth in happiness that economists predict. Current industrial and technological progress is no longer dramatically boosting well-being the way it has in the past (Gordon 2017). We consume more, live in bigger houses, drive and fly faster than ever before, but we trust our neighbors less, work and commute longer hours, are less healthy, and remain on the hedonic treadmill. The US traditionally uses GDP to track progress, this measure does not capture the

emotional well-being of the nation, and it does not concern itself with equity issues, nor is it a sustainable model for the long-term health of our people and planet.

Happiness has come to be considered a better measure of national progress. Prompted by the United Nations (UN), World Happiness Reports have been published annually since 2012 examining factors that influence happiness, both social and personal. In June 2016 the Organization for Economic Cooperation and Development (OECD) committed “to redefine the growth narrative to put people’s well-being at the center of governments’ efforts.” (World Happiness Report 2017, 3) Widely comprehensible, place-based, and politically popular, happiness has been also been recognized as a potentially powerful goal for community planning that may help bring together competing desires community development practitioners face working to implement the three pillars of sustainability—environment, economy, and social equity (Cloutier 2017).

Neuroscientists, psychologists, environmental psychologists, economists, planners, architects, and others seek to define, measure and trigger happiness. Research demonstrates the significance of environmental factors, on a par in some studies with the impacts of socio-economic and demographic factors. (Nettle 2005, Brereton 2008) By making happiness a design priority, a substantial difference can be made in people’s lives, particularly as good architectural, urban design, and planning decisions coalesce and multiply positive effects in the growth of communities and cities designed for happiness.

1.2. What is the Science Telling Us?

Nature’s impact on improving happiness through its restorative effects have been supported by research on just about every scale: a plant in the office (Evensen 2015), a view out the window (Kaplan 2001), a walk through a green campus (Hipp 2015), a visit to a pocket park (Nordh 2013), a day in a garden (Chen 2009), the greening of a playground (Kelz 2015), and living daily in a natural setting. (Liitsi 2014) Exposure to nature has also been linked to reductions in crime, reduced levels of aggression, and higher levels of altruism (Montgomery 2013, Korpela 2001). Nature relatedness is a significant distinct predictor of many happiness indicators, even after controlling for other subjective connections, e.g. with friends or country. (Zelenski 2014) People report happiness more in nature than in urban environments (MacKerron 2013).

Within environmental psychology, restorative theory proposes that natural settings promote recovery from stress and fatigue via attention restoration mechanisms. This state of emotional recovery from stress is seen as a key element in improving happiness. Soft fascination (intriguing environmental stimuli) typical in nature, promotes involuntary attention, enabling cognitive recovery. By contrast, hard fascination (demanding stimulation) present in lively settings, grabs attention, increasing cognitive load. Neuroscientific studies also support this theory. In one test, subjects walking outside wearing EEG devices demonstrated evidence of lower frustration, engagement and arousal and higher meditation when in a green park; and higher engagement and frustration when in active hardscaped urban zones (Aspinall 2013). Being relaxed, being away from everyday life, forgetting worries, and reflecting on personal matters link people’s favorite places to *restorative* experiences. Natural settings, compared to urban settings, lead to a reduction in physiological indicators of autonomic arousal, as well as to an improvement in mood (Herzog 2008).

Within the broad category of nature and people’s ability to engage with nature, the authors identified seven sub-factors that are particularly relevant to the work of architects and urban designers: biodiversity, water, social interaction in nature, surprise in nature, sunlight as a source of well-being, community connection to nature, and universal access to nature. We will examine these factors one by one within the context of a case study project.

1.3. Test Case Location: Baltimore City, Maryland, USA

Research performed by Vemuri et al. in Baltimore City discovered that *access to a clean natural environment always contributed to higher satisfaction*, regardless of the scale of analysis (Vemuri 2011). This shows the great potential for really impactful environmental interventions. Baltimore has suffered from egression, disinvestment and destructive urban renewal strategies. Many city residents struggle with blight, crime and limited opportunity, even as opportunistic investors reinvest in downtowns in the form of wealthy enclaves, often subsidized by the government. Butting up against this wealth, city poverty grows stark by contrast, exasperating discord. Existing vacancy and blight in Baltimore City provides opportunities to rethink and redesign the city’s future growth and recovery, aiming for a happier future.

2.0 INTEGRATING NATURE THROUGH DESIGN

2.1 Design Strategy: Amplify Biodiversity

Test subjects reported feeling healthier, more connected, and more grounded after spending time in parks with many different kinds of trees and birds than in parks that distilled nature down to lawns and a few trees.

(Montgomery 2013) Other studies reinforce the idea that design complexity enhances preference for certain landscapes (Kelz 2015), specifically perception of species richness (birds, butterflies, plants), and riparian tree cover shows notable increases in reported well-being (Leyden 2011, Dallimer 2012).



Figure 2: The Palm House Natatorium, shown here in section, brings a much needed interactive experience with biodiversity to the public in a blighted urban grey-scape. Source: (Habtour)

Test Case: Architectural Acupuncture Brings Biodiversity. A Palm House Natatorium brings together a tropical palm house, a public pool, and community gathering spaces. Carefully placed to maximize positive impact, it acts as a community anchor and a place of respite from the stresses of Baltimore City life. As a publicly accessible institution, it is egalitarian and restorative.

2.2 Design Strategy: Integrate Water

A focal point within a landscape, along with vegetation and water are identified as meaningful elements for a restorative experience. (Herzog 2008) Waterfront is frequently mentioned in surveys when asking people to describe a happy place. (Habtour 2016) Exposure to Amsterdam's Eastern Docklands, whose main feature is water with very little green, proved to have equivalent restorative effects on test subjects, to lush green rural Dutch Amstelland (Karmonov 2008). A bold water feature can cancel stress-inducing noise from a busy urban street, drawing in users as exemplified in New York City's popular Greenacre Park (Whyte 1980).

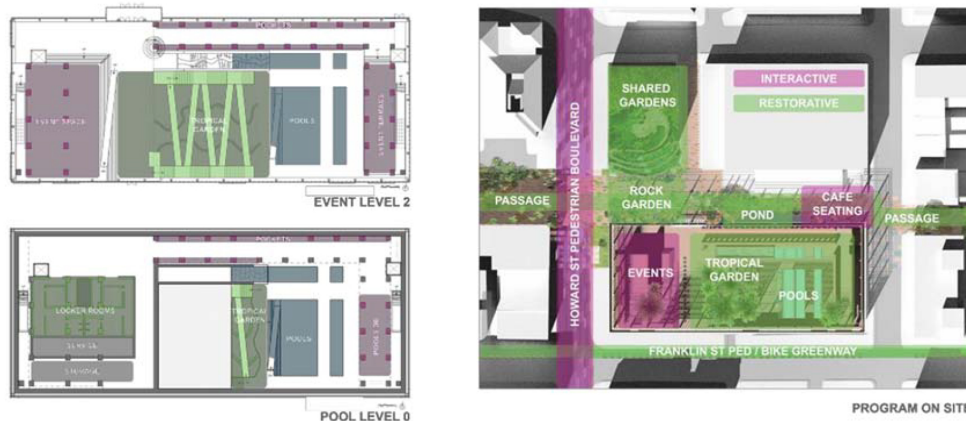


Figure 3: The program shown in plan of the Palm House Natatorium building and site highlights approaches to bring the public both restorative and interactive opportunities by co-locating water, nature, and social spaces; including accessible swimming pools, a tropical garden, and public event spaces on the inside; and a pond, gardens, and cafe seating outside. Source: (Habtour)

Test Case: Pools Inside and Ponds Outside. A large pool accessible by an ADA compliant ramp, a separate lap pool, a smaller warm relaxing pool, and a waterslide make up the water elements on the inside, surrounded by tropical foliage and trees. In a city where many do not get the opportunity to vacation someplace tropical, this offers an opportunity to get away. Outside is a rock garden and pond, offering places to explore, sit, and dip one's toes as local plant species sprout along the water's edge.

2.3 Design Strategy: Encourage Positive Social Interaction

A study on pocket parks identified popular activities like relaxing, philosophizing, reading, social play, physical activities, eating/drinking and that short informal contacts are highly important to well-being (Nordh 2013). Friendly interactions with neighborhood people can give a positive oxytocin boost without the added stressors that come with serious relationships (Montgomery 2013).

One key to creating a framework for positive social interaction is to provide several options so people may exert control their preferred social experience (Halpern 2008). Using nature to slow traffic or to buffer pedestrian areas, bicycles, and cars, allows people to feel safe, reduces noise, encouraging walking and conversation (Montgomery 2013). Providing comfortable seating in a nature enhanced spot creates casual social opportunity. Integrating nature on the way to, or in relation to a benefit, like food, work, recreation, or a cultural venue builds on the meaningful relationship between sociability, happiness, and access to amenities, such as movie theaters, museums, recreation, concert halls, and libraries (Leyden 2011).



Figure 4: Interior of the Palm House Natatorium providing people the opportunity to build relationships with each other and identify with a local landmark, through sharing the experience of a unique biodiverse setting. Source: (Habtour)

Test Case: A Variety of Options for Linger Among the Plants. The Palm House interior provides multiple visible egress options, and a variety of places to linger, wander through the plants, lounge by the pools, walk on the balcony, or sit beneath the palms. The mid-block exterior of the community tropical retreat brings biodiversity to human level with birch trees and wildflowers interspersed on a wide path for people to meander between on their way to and fro. Cafe style chairs and tables adjacent to a neighboring coffee shop overlook a rock garden and small pond with more places to sit, climb, wander through, and play. Native plants peek out between the rocks and frame the water. Linking transit, housing, businesses, schools, and community assets as well as providing places to dwell, the site offers opportunities for incidental or intentional nature experience within a daily commute.

2.4 Design Strategy: Strive for Beautiful Surprises

The pleasure centers of the brain light up when surprised with something pleasant, even more so than when a pleasant thing is expected (Berns 2001). Self-reported overall satisfaction with life is substantially higher when subjects are asked after a pleasant surprise, on a sunny day, in a beautiful room, or on a day going better than expected (Nettle 2005). A study of the relationships between happiness and city design found that the perception of living in a beautiful city had the strongest correlation with happiness (Leyden 2011). Case studies conducted in Kristianstad, Sweden, and Copenhagen Denmark focused attention on the ability of incidental nature experience to use surprise and engage soft fascination. One example studied was a heavily used pedestrian bridge over a wetland area linking different parts of Kristianstad, Sweden, with transportation nodes and a variety of uses. Visitors engaged in their daily commute would be surprised by otters and other marsh wildlife near and under the bridge, and would often linger, and share their experience on social media, making it a popular place to visit and hang out. Bridge users enjoyed the regular opportunity for surprise, fascination, and attention redirection from their daily tasks (Beery 2017). Designers can utilize the changes inherent in nature to create surprising, interactive experiences.



Figure 5: Mid-block exterior of the Palm House Natatorium incorporating art, nature, and active programming to keep a city thoroughway feeling safe and welcoming into the night. Source: (Habtour)

Test Case: Activating Pleasure and Wonder with Art and Nature. At night on the mid-block exterior of the Palm House, an artist's LED light installation mimics the movement of fireflies flickering up through flowers and grasses, seeking both to draw a sense of fascination from the human visitors and attract real fireflies. Among grasses and pebble paths people discover animal sculptures by local artists to sit and play on. Flowering bushes host families of birds. A water feature edged by a rock garden ripples reflections of the light and activity spilling out of the adjacent glass building, all of which help keep the outdoor space active, safe, and enjoyable late into the evenings.

2.5 Design Strategy: Use Sunlight as a source of Well-Being

Natural light cycles support internal circadian rhythms, boost serotonin levels, and are a necessity for good health and happiness. Going with too little daylight for too long can lead to depression, sleep disorders, and other maladies (Senne 2005). However, sunnier climates do not necessarily mean greater happiness. Iceland is considered one of the happiest places in the world. Mark Easton at the BBC in his article about sunshine and happiness quipped "Perhaps it is not the sunshine that matters so much as the pleasure we get when our weather changes?" (Easton 2012, 1). One of the important psychological aspects from daylighting is meeting a need for contact with the outside living environment. (Edwards 2002). Extrapolating this human need for sunlight into design recommends a sunny wall to warm by in winter, a leafy canopy to cool under on a hot day, a framed shaft of light revealing the shifting shadows of time gliding forward, or a surprise of magical refraction, scattering the colors in dazzling ways.



Figure 6: Palm House Natatorium in sections shows the utilization colored glass and exterior climbing plants as shading mechanisms that respond to changes in season and time of day. Opportunities for users to choose places to linger with nearly full, sun, filtered light, or full shade are present. Source: (Habtour)

Test Case: Using Nature & Color to Filter Sunlight. To minimize solar gain and capture the beauty of light filtration, the Palm House celebrates a variety of natural light experiences using a combination of climbing plants, and translucent colored angled fins all along the exterior south & west facades and in the roof, creating a cathedral-like atmosphere, intertwined with the dappled texture of a forest floor. There are spaces in full shade, and the lower floor spaces allowing slots of natural light into their quiet solitude, providing visitors a variety of natural light experiences to explore and enjoy.

2.6 Design Strategy: Capitalize on Community Priorities

Every community has priorities and initiatives already in motion to address identified needs. Those may be headed by governments, community groups, or non-profit organizations. Bringing happiness through nature overlaps in a surprising amount of ways with other objectives, and a synergy of purpose can multiply the positive impact of everyone's work. Does the community need stormwater improvements? Create rain gardens to beautify a bland urban street. Need to reduce city maintenance costs? Well planned native polyculture can eliminate the need for mowing, reduce or eliminate watering, while enhancing biodiversity, supporting local pollinators and wildlife. There are many opportunities for win-win solutions when seeking to build happy communities.

A great example of this is the green cycle lane network in Copenhagen Denmark. Dedicated to cycling along vegetation and water it allows for shortcuts and provides calm and pleasant cycling environments. Cyclists asked to map positive and negative experiences highlighted the importance of nature in forming positive experiences. While building the network, Copenhagen planned for incidental nature experiences while building on efforts to ensure that human environments are resilient to environmental, social, and economic challenges. Continued planned and connected green infrastructure offered intentional and incidental experience along with many corridors which support daily movement while addressing conservation efforts (Beery 2017).



Figure 7: Proposed Baltimore Greenways infrastructure to encourage walking and biking by providing safe and pleasant routes, gives people multiple opportunities for intentional or incidental daily interactions with nature. Site-specific linkages between small urban parks promote possible local interventions for pedestrian and cycle prioritized passage. Source: (Habtour)

Test Case: Creating a City Wide Greenway Network. To increase the frequency and quality of city resident's interaction with nature, a network of nature enhanced pedestrian and cycle routes is built throughout the city connecting to the architectural site. The city is checkered with several large impervious asphalt lots, crumbling vacant buildings and a few parks of varying quality and upkeep. The opportunity for improving the experience of walking and biking through downtown is significant. With thoughtful design, this network dovetails beautifully with city strategies to improve stormwater management, to reduce flooding and polluted runoff poisoning the bay and to build bicycle infrastructure. As a large civic project, it provides opportunities for youth-works, and second-chancer programs for employment, skill building, and community connections. Public nature-oriented architectural interventions become connectors, icons, and visual landmarks in the greater greenway system.

2.7 Design Strategy: Ensure Access to All

Injustice is a historic and chronic cause of unhappiness. As wealth inequality continues to rise in America, the haves and have-nots are increasingly segregated. Opportunities for people to experience natural interactions of quality and other amenities that support happiness vary enormously. Striking inequality leads to stigmatization and negative comparisons, which on the individual and community level are extremely harmful to happiness (Nettle 2005). Equality, empowerment, and inclusion are vital, (Soul of the Community 2010) as are geographical and socio-economic context, because of the impact social and spatial inequalities and social justice (Ballas 2013) have on happiness. One can create the most uplifting nature integrated experiences in the world, but if those are only regularly accessible to the privileged, the happiness project fails. The design challenge is finding ways of weaving the positive environmental impacts into everybody's every day, to be experienced with frequency and in close proximity.



Figure 8: The Palm House Natatorium demonstrates design strategies for happiness by providing public access, incorporating nature, including surprises and play, engaging people socially and contributing to a place-based sense of identity by offering a unique new connection to a rich local history. Source: (Habtour)

Test Case: Serving Equality by Proximity and Affordable Public Access. As a publicly accessible, entry donation optional, institution centrally located at a transition between struggling and more stable areas, it serves the wide range of local demographic groups already present, which include people with low, middle, and upper incomes, school children, college students, professionals, senior citizens, blacks, whites, a variety of other races and ethnicities, diverse sexual orientations, and people with disabilities. The site immediately connects transit stops to local schools and residents, and businesses. Complimentary planning around the site retaining and incorporating affordable and assisted housing and amenities with the newer mixed-use market-rate development can improve the area with ongoing inclusivity.

CONCLUSION

Design strategies extrapolated from a broad array of research on factors for human happiness have potentially universal application to the work of architects, planners, and urban designers. When designers incorporate aspects of nature into the human environment, they shape spaces with the potential to increase the happiness of the inhabitants. While the virtual test case explored here is one specific example focused on an immersive nature experience in an urban area, these principles can be applied at different scales, and in different contexts.

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