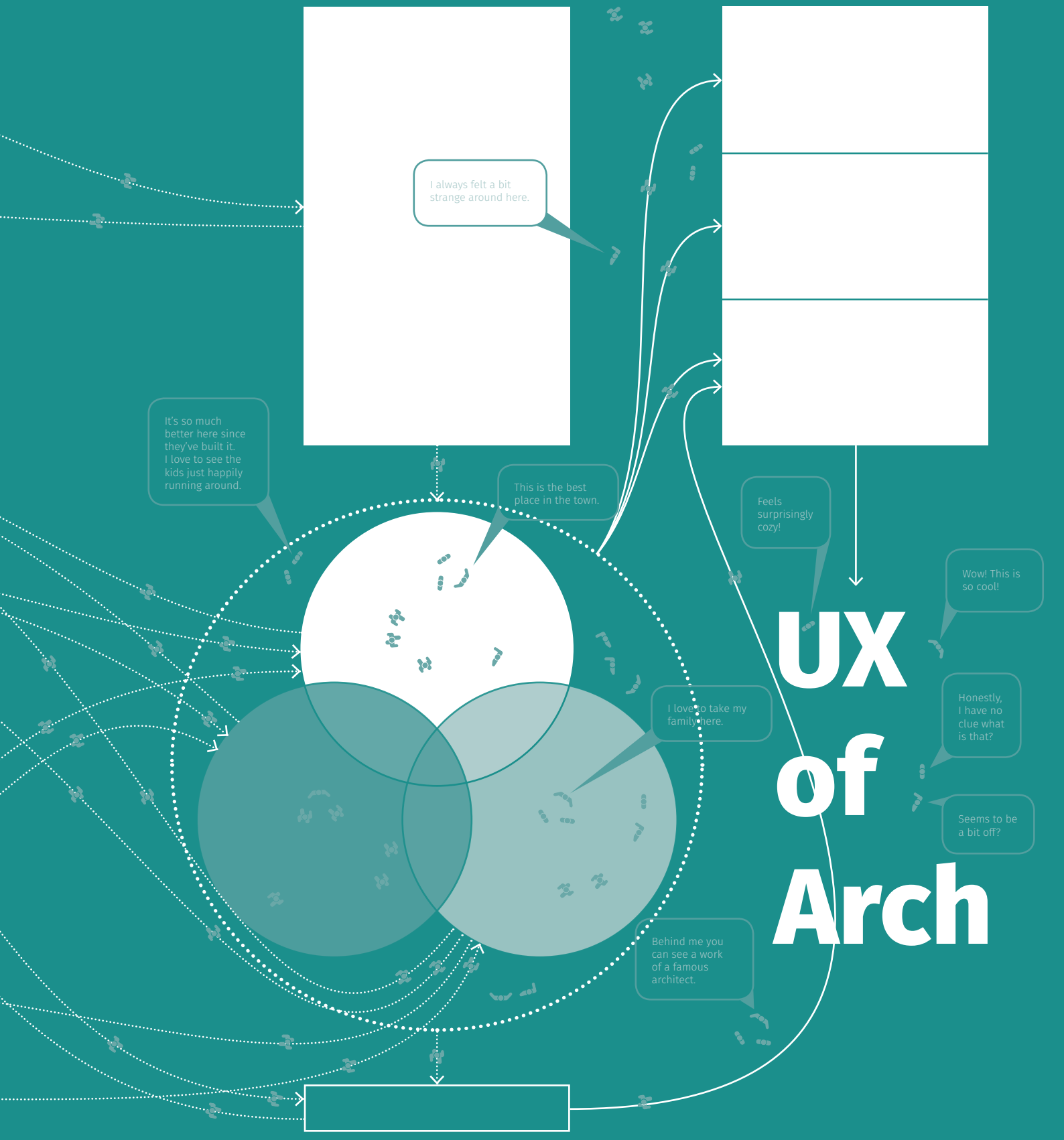

UX of Arch

Shaping the user experience of architecture through evidence-based design

Graduation research plan | Šimon Knettig | 2023/2024

UX of Arch

Shaping the user experience of architecture through evidence-based design

Graduation research plan

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City of the Future studio

Delft University of Technology
Faculty of Architecture and the Built Environment | Architecture track
2023/2024

Keywords

User experience research, user experience in the built environment, evidence-based design, participatory study using virtual reality, Jižní Město, concrete-prefab construction revitalization

Introduction

"The nightmare would start moments after entering the lobby. Stench of urine, beer, and stale sweat would seep from shadows, the lights would be smashed again and the corridor vandalised into gloom. Silence did not mean no one was there. [...] Fresh graffiti, used condoms and a passed-out vagrant might have been waiting inside when the doors parted. [...] Grind up another three floors and you would be where a 27-year-old woman was dragged from the lift and raped. Down the same corridor a depressed young mother jumped to her death. On the 21st floor, an 11-year-old girl was dragged from a lift into the chute room and attacked." [1]

While it may sound like a description from a fictional horror movie, this was a real story of the Trellick Tower, or better to say its residents in the once so-called 'Tower of Terror'. Designed by Hungarian architect Erno Goldfinger, the tower "was supposed to represent a utopian future in which families could live high above the smog, with every convenience close at hand." [2] But the opposite was true. Within months after its completion, the level of vandalism, burglaries, muggings, and rubbish led the inhabitants to 'beg' the municipality for a solution to this failed dream.[3]

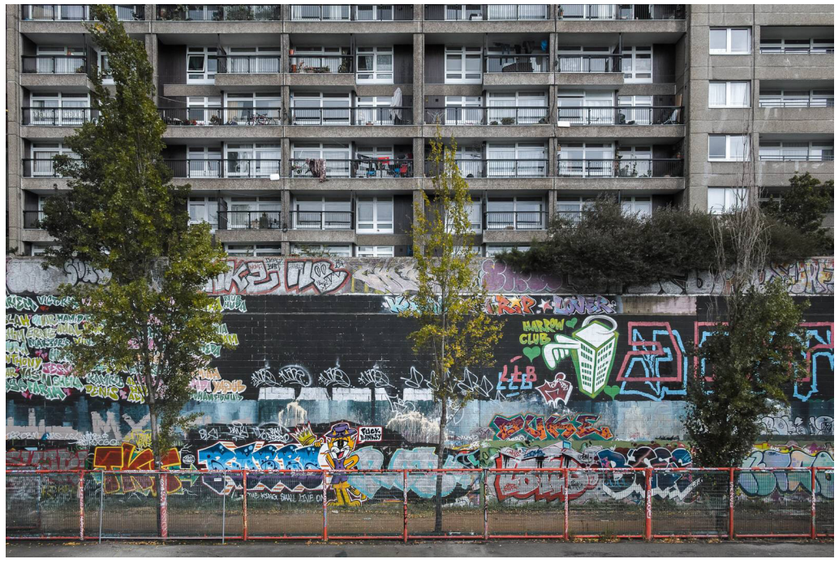

Figure 1: The failed dream of the Trellick Tower, or the so-called 'Tower of Terror' [Imgur, Trellick Tower, London [OC].]

I've always been fascinated by such stories. Stories of a beautiful architect's dream with good intentions that just terribly failed. I've been fascinated by the profession that aims and claims to provide more liveable spaces enriching users' experience but is still able to confidently propose a design that is, in fact, very far from such a goal. Because this is not the only example. Such unsuccessful projects can be found around the world. The dream of Brasilia, a utopian modernistic city that degraded into a violent place with never-ending traffic jams. Masdar City, a vision of Abu Dhabi's zero-carbon 'ecotopia', which has currently only a few hundred inhabitants comparably to the 50,000 initially expected. And likely the most controversial urban vision under construction today, the 170km long 'Line', is already doomed by some experts.[4,5,6]

Figure 2: The 'deserted' desert city of Masdar, once a vision for sustainable 'ecotopia' [7] [Malapert.]

While certain explanations for these situations have been provided, the 'precise' descriptions of what kind of architectural typologies or methods contributed to such bad consequences seem to be missing. It's important to recognize here that the built environment is a construct of a multitude of stakeholders or experts and architects have only limited power in this process. Nevertheless, how much do architects truly know about the impact of their designs on end users?

When the High Line project in New York City was initially proposed, most of the developers were against it. They distrust the idea that it would attract as much attention and appreciation to be economically feasible. It was a big risk. Nowadays, High Line gets 7 million visitors per year surpassing the popularity of the Statue of Liberty or the Empire State Building. Consequently, this popularity brought also large revenues in the form of tax for a municipality and drove multiple new developments in the area.[8]

1 Carroll, "How Did This Become the Height of Fashion?"
2 "From 'Tower of Terror' to Brutalist Icon: A London Landmark Abides, Property - THE BUSINESS TIMES."
3 "From 'Tower of Terror' to Brutalist Icon: A London Landmark Abides, Property - THE BUSINESS TIMES."

4 Carroll and Phillips, "Trouble in Utopia as the Real Brazil Spills into Niemeyer's Masterpiece."
5 Miller, "A Rare Tour Of Masdar, The Failed Smart City In The Arabian Desert."
6 Barker, "Sustainability and Liveability Claims of Saudi 170km City Are 'Naive' Say Experts."
7 Miller, "A Rare Tour Of Masdar, The Failed Smart City In The Arabian Desert."
8 Wiggins, "Get the Money, Then Get the People."

Figure 3: Highline in New York as an example of a successful project in matters of user experience drawing 7 million visitors annually and fostering development in the area around.[9,10]
[Baan, The High Line.]

Clearly, architectural designs have the potential to enhance user experience (UX) in the built environment. However, the seeming lack of clarity, evidence, and reliability in the process generates often counter-effective outputs and distrust among other stakeholders.

Problem statement

I encountered this situation frequently throughout my studies to the point where I almost became unconscious of it. It became the norm for me. This refers to the UX design methodologies taught in my architectural studio classes. As a student, I would present designs for spaces aiming to evoke various emotions – coziness, excitement, calmness, warmth, coolness... I had my 'logical' reasonings, such as material choices, color palettes, functional connectivity, or lighting accessibility. However, during consultations, the studio tutor often challenged my ideas, offering counterarguments that, though sounding reasonable, occasionally clashed with my intuition and generated distrust.

As a result, I asked for evidence. Something I could study to better understand the issue. However, I would often receive rather subjective explanations 'proved' by the experience of that single person. From an external observer's point, it was a clash of individual perceptions without a clear resolution. Still, despite my initial skepticism, I ultimately chose to trust this judgment based on the designer's experience.

Years later, however, the same issue arose in practice as well. We would meticulously design an enveloping structure for a space, with the intention of making it exciting and inviting, envisioning it as the standout 'crown' that would draw people from across the city. Internally, we truly believed the concept. However, when facing the jury during the final competition round, doubts were cast: "What's the tangible benefit of this structure? Can you guarantee people will perceive it the way you do?" The honest truth is, we couldn't. We could not guarantee that our designer's perspective would align with that of the users. Although we had certain arguments, we had no direct proof, no evidence that would support our claims, and due to the distrust, other stakeholders were unwilling to take the risk.

While this is only a personal story, the issues and questions it raises have broad relevance within the field. Human perception is inherently individual, influenced by unique contextual and physiological factors. The question then becomes: How can a single architect, with their distinct perspective, truly grasp the numerous individual perceptions in society – how to reach full user inclusion?

A 2021 study from the Architect's Council of Europe revealed that only 13% of architectural firms in the EU offer (not necessarily conduct) what's known as 'post-occupancy evaluation' for their projects.[11] Given this limited data feedback, how do architects design for user experience in reality? What knowledge informs their decisions? What is the probability of success, and how precisely can they target the specific user needs? Furthermore, what methods might prove more efficient in this regard?

9 "The High Line."
10 Wiggins, "Get the Money, Then Get the People."
11 Mirza & Nacey Research Ltd, "ACE 2020 Sector Study: ACE."

per cent of practices who offer service	offer a Post Occupancy Evaluation	Stage at which architects agreed to undertake the POE:		
		Design phase	Construction phase	after Completion
Austria	14	46	31	23
Belgium*	10	11	11	78
Croatia	6	100	0	0
Czechia	1	67	33	0
Denmark	6	0	0	100
Estonia*	0	n/a	n/a	n/a
Finland	9	20	40	40
France	10	41	7	52
Germany	8	43	18	39
Greece	18	33	17	50
Hungary*	27	25	25	50
Ireland	17	52	4	44
Italy	12	39	25	36
Lithuania*	13	0	100	0
Luxembourg	17	54	8	38
Netherlands*	25	56	0	44
Norway	11	50	0	50
Poland*	13	60	20	20
Portugal	26	22	19	58
Romania	35	28	23	49
Serbia*	0	n/a	n/a	n/a
Slovakia	7	18	45	36
Slovenia	7	56	0	44
Spain	15	30	10	60
Sweden	4	43	14	43
United Kingdom	24	39	9	52
2020 EUROPE-26	13	*38*	*18*	*45*
2018 EUROPE-26	*13*	*n/a*	*n/a*	*n/a*
2016 EUROPE-27	*n/a*	*n/a*	*n/a*	*n/a*
2014 EUROPE-26	*n/a*	*n/a*	*n/a*	*n/a*
2012 EUROPE-25	*n/a*	*n/a*	*n/a*	*n/a*
2010 EUROPE-23	*n/a*	*n/a*	*n/a*	*n/a*

* caution - small sample

Table 1: A ‘post-occupancy evaluation’ offered by architectural offices in the EU.
A rather low percentage suggests a lack of data for efficient UX design.
[Mirza & Nacey Research Ltd, Architectural Practices Offering POE Analysed by Country.]

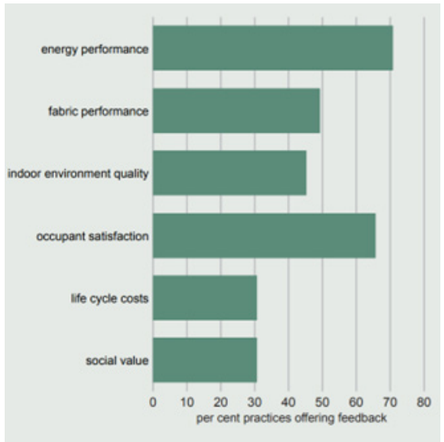

Table 2: The type of feedback typically included in ‘post-occupancy evaluation’.
An occupant satisfaction study (comparable with a UX study) is not yet an absolute standard in the evaluation.
[Mirza & Nacey Research Ltd, Type of Feedback Typically Included in POE.]

[12] Vránková, Šulek, and Cibulka, “Jižní Město – sídliště bez lidí?”
[13] Horváth, “Jižní Město řeší problém s narůstající kriminalitou, okradli tam i starostu.”
[14] Veselá, “‚Lidské králíkárny‘ jsou v Praze už 50 let. Sídliště Jižní Město zanechalo odkaz i v kultuře.”
[15] Skálová, “Praha má přes padesát sídlišť, paneláky přežily předvídanou smrt.”

To explore these initial questions, I chose a testing site. One that faces UX issues leading to broader social problems, such as facility abandonment, rising crime, and class segregation: Prague’s Jižní Město district.[12,13] This 1970s development typifies the prefab concrete-panel high-rises constructed under the communist regime in the country. Currently, roughly 40% of Prague’s population lives in such standardized developments and Jižní Město is the largest among them.[14,15] Therefore, addressing its issues could have a profound impact on the lives of Prague residents.

While these developments offer certain advantages, like the amount of vegetation, good public transport access, and nearby schools, strolling through Jižní Město is not particularly enjoyable. Largely due to its repetitive character, it’s hard to read, dull, empty of activities, and generally empty of ‘life’ of any kind. Some parts feel so hostile that the district earned the unflattering nickname ‘lidské kralíkárny’ or ‘human rabbitry’.[16]

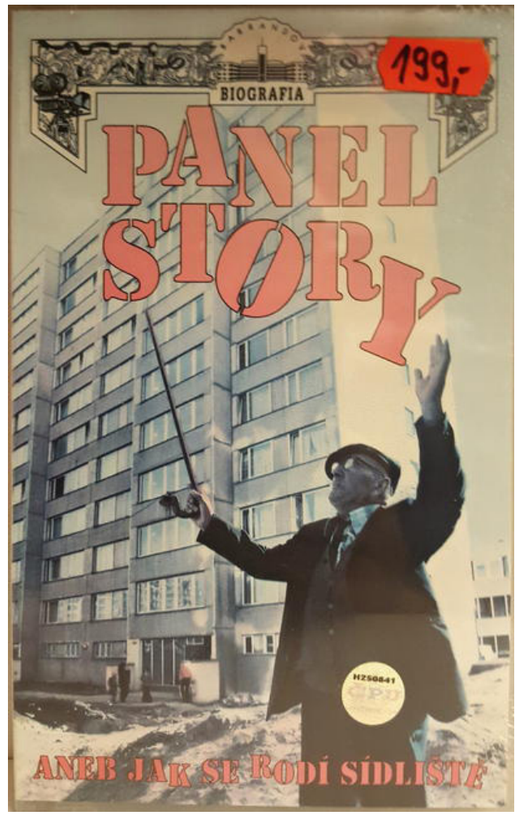

Figure 4: A villager lost in the repetitive environment of ‘panelák’ – a prefabricated panel concrete apartment building.
A scene out of a satiric 1979 movie ‘Panelstory or Birth of a Community’ which had been banned for many years due to critically depicting the communist society and its construction of Jižní Město.[17]
[Panelstory aneb Jak se rodí sídliště.]

[16] Veselá, “‚Lidské králíkárny‘ jsou v Praze už 50 let. Sídliště Jižní Město zanechalo odkaz i v kultuře.”
[17] “Panelstory.”

The district faces demographic shifts, with the elderly population increasing from 8.3% in 1980 to 18.6% today. The number of foreigners, especially from Eastern Europe – Moldavians, Ukrainians,... has doubled in the past decade.[18] Families who live here often do so out of necessity or as a temporary solution before moving to more desirable localities.[19] Jižní Město faces threats of ghettoization, class divisions, rising crime, and an overall decline in quality of life. How can we reverse these trends?

Figure 5: Jižní Město, the largest prefabricated concrete panel district in the Czech Republic faces a possible threat of ghettoization due to its undesirable character.[20]
[Divíšek.]

[18] Vrănková, Šulek, and Cibulka, "Jižní Město – sídliště bez lidí?"
[19] Prokop, "Co vede k vylidňování Jižního města a jaké kroky podniká MČ Praha 11?"
[20] Veselá, "‚Lidské králíkárny' jsou v Praze už 50 let. Sídliště Jižní Město zanechalo odkaz i v kultuře."

Research questions

Main research question:

What kind of architectural design process could provide evidence-based suggestions to efficiently and reliably enhance the individual users' experience of Jižní Město to the point when the district becomes desirable for the current and new generations?

Sub-research questions:

Localizing the problem

1. When was or is Jižní Město undesirable regarding the UX?
2. Where, in which areas, is Jižní Město undesirable regarding the UX?
3. Which social group finds Jižní Město undesirable regarding the UX?

Understanding the problem

1. Which research methods historically brought possibly false conclusions about users' needs and desires in Jižní Město?
2. What kind of architectural design methods did not target specific user needs in Jižní Město correctly and efficiently?

Targeting the problem

1. Which research methods could unveil the true individual users' needs and desires in Jižní Město?
2. What are the individual users' needs and desires in Jižní Město?
3. What kind of architectural design methods could target specific user needs in Jižní Město with a definable efficiency supported by evidence?

Theoretical framework

Issues and questions raised before touch upon a multitude of themes, however, all pivoting around one element – the user. To understand the user and their experience, it is first needed to understand their perception and specific use of the built environment. This will be done through compiling existing literature, but also through original studies and methodologies. The entire theoretical body is therefore organized in a matrix of these topics – perception, use, and methods to research them. This matrix serves as a knowledge source for executing the methodological steps of the project, but also findings from the methodological process generate new theories. It is then an intertwined system where information flows both ways.

Furthermore, considering the scope of the topic of human consciousness, an interdisciplinary approach is needed to enrich the knowledge within the field. What's called 'UX research' in software and product development will therefore become a key source of methodological approaches. The following theory areas are included:

1. Compiled existing knowledge on human perception, use of the built environment, and methods to research them:

   1.1. **Architectural research on perception and use of built environment**

   Starting with the revolutionary works of Jane Jacobs and Kevin Lynch from the 1960s and ending with Jan Gehl together with David Sim in 2010s, the selection represents a historic overview of the knowledge on the subject within the field.[21,22,23]

   1.2. **Healthcare evidence-based design**

   Based on the first study of Professor Roger Ulrich in 1980s, this healthcare design approach brings scientific evaluation into the practice. It has clear results such as reduced pain in patients due to the increased UX.[24]

   1.3. **Psychology/sociology**

   Understanding the basics of human cognition and decision-making is crucial in determining the probable UX of an architectural design. Books by psychologists Gilovich and Ross together with Nobel laureate Daniel Kahneman will provide the knowledge foundation.

   1.4. **Neuroscience**

   Interdisciplinary research between neuroscientists and architects led by the Finnish architect Juhani Pallasmaa known for his phenomenological work provides knowledge on the direct sensual reactions of our bodies to the built environment.[25,26]

   1.5. **VR**

   With its ability to 'prototype' designs 1:1 making it more understandable for users with little to no financial or environmental impact, VR has great potential as an architectural research tool. In its collective publication, Phil Jones and Tess Osborne provide a guide on how to use this technology for researchers in the social sciences and humanities.[27]

   1.6. **UX/UI research**

   Since its foundation about 25 years ago, UX research has boomed significantly. Nowadays, every major tech company has its UX research department collecting significant amounts of data about their users to optimize their products.[28] This rich methodological knowledge will be transferred to the built environment.

2. Compiled existing knowledge on Jižní Město and panel construction in the Czech Republic, including redevelopment case studies.

   2.1. **Sociology**

   Studies conducted by the 'Socioeconomics of Housing' department of the Science Academy of the Czech Republic unveil statistics and interpretations about multiple housing topics including the most desirable typology among citizens.[29]

[21] Jacobs, The Death and Life of Great American Cities.
[22] Lynch, The Image of the City.
[23] Sim and Gehl, Soft City.
[24] Marberry, "A Conversation With Roger Ulrich - HCD Magazine."
[25] Architectuul community, "Juhani Pallasmaa."
[26] Robinson and Pallasmaa, Mind in Architecture.
[27] Jones and Osborne, Virtual Reality Methods.
[28] Ross, "Changes Over the Last 25 Years of UX Research :: UXmatters."
[29] Lux, Sunega, and Kubala, "Dráhy bydlení mileniálů."

2.2. **Architecture**

The study of Central European prefabricated housing districts ‘Sídliště, jak dál?’ under the leadership of Czech Technical University’s professor Michal Kohout represents recent local comprehensive research on the topic. It also provides a list of case studies from Europe on the topic of revitalization of these developments.[30]

3. Compiled acquired knowledge from the participatory studies in Jižní Město conducted as part of the methodological process.

The enriched theory matrix is going to provide answers to the research questions at the end of the methodological process.

Methodological process

1. Study of existing literature from and outside the field on human perception and usage of the built environment and methodologies to research them.
2. Study of existing literature on Jižní Město and panel construction in the Czech Republic, including redevelopment case studies.
3. Locating a testing site within Jižní Město – a typical representative of the district. The site will be examined from a pedestrian perspective of the public space in between buildings. Reasons for choosing this site:
    3.1. 40% of Prague inhabitants are living in this type of development – potentially high impact.[31,32]
    3.2. Repetitive typology character makes edits easier and multipliable.
    3.3. I am familiar with the site, and language and have, therefore, a greater chance to connect with potential survey participants.
4. Preparing a series of design studies for the specific site with systematic changes of individual parameters (such as levels of density, porosity, greenery, amenities,...)
5. Testing these studies with a participatory survey methodology including VR derived from the initial research in the literature. The survey will be conducted qualitatively in the form of open questions about different experience topics, but also quantitatively where for instance the VR eye-tracking capability could unveil a higher level of interest about specific elements of the design.

    The disadvantage of VR is the lack of other sensual triggers besides visual, audible, and vestibular that contribute to the complete spatial experience. Nevertheless, the immersive 1:1 scale experience of VR is likely the closest to reality compared to other tools such as scaled models, 2D renderings, sketches, or drawings. Thanks to that it also makes the entire design process more inclusive since the user may better imagine and understand the final output and therefore more accurately review the design proposal before it’s built.[33]

    At the same time, the potential of gaining ‘perfect’ knowledge about the user’s cognition raises a high level of responsibility. Such personal data are extremely valuable for marketing and political intentions and due to their emotional character also quite easily abusable.[34,35,36] In the worst imaginable scenarios, with the knowledge proposed and the use of behavioral targeting, companies can sell designs that seemingly fulfill the needs of their users but are less of quality in reality.[37] Or in another scenario, entire ethnic groups could be intentionally manipulated to move to specific areas to provide space for more ‘prominent’ communities. It is, therefore, crucial to ensure correct privacy management and keep the initial intentions of enhancing UX rather than abusing the knowledge about it.
6. Evaluating the user’s satisfaction with individual designs. Conclusions will add to the theoretical knowledge of the UX in a built environment.
7. Deriving typological principles for the site that enhance UX – these typologies can serve as general guidelines for other potential revitalization projects for the site adding to the theoretical knowledge.
8. Application of the principles on the final design.
9. Participatory reassessment of the final proposal generating again new theoretical knowledge.
10. Reflection on the entire methodological cycle, its positives and negatives, and its relevancy for further research.

30 Kouhout, Sídliště, jak dál?
31 Veselá, “‚Lidské králíkárny‘ jsou v Praze už 50 let. Sídliště Jižní Město zanechalo odkaz i v kultuře.”
32 Skálová, “Praha má přes padesát sídlišť, paneláky přežily předvídanou smrt.”
33 Milton, “Do Clients and Contractors Struggle to Understand What Your Projects Should Look Like?”
34 Sundaram, “Council Post.”
35 Ratson, “The Power of Emotions in Decision Making | Psychology Today.”
36 Brown, “UX in the Age of Abusability.”
37 “What Is Behavioral Targeting?”

Research Questions

UX of Arch

What kind of architectural design process could provide evidence-based suggestions to efficiently and reliably enhance the individual users' experience of Jižní Město to the point when the district becomes desirable for the current and new generations?

Localizing the problem

When was or is Jižní Město undesirable regarding the UX?

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Understanding the problem

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What kind of architectural design methods did not target specific user needs in Jižní Město correctly and efficiently?

Targeting the problem

Which research methods could unveil the true individual users' needs and desires in Jižní Město?

What are the individual users' needs and desires in Jižní Město?

What kind of architectural design methods could target specific user needs in Jižní Město with a definable efficiency supported by evidence?

Methodology

Research in literature and news media
In and outside the field

Compiling existing knowledge of the site area

Locating a specific testing site

Series of studies for the site

Participatory evaluation of the study series with locals

Deriving design principles for the site

Application on the final proposal for the site

Participatory reassessment of the final proposal

Reflection on the broader impact of the methodology

Theoretical framework

Research areas

Existing studies of the site area – Jižní Město

Architectural research on the perception and use of space

Healthcare Evidence-based design

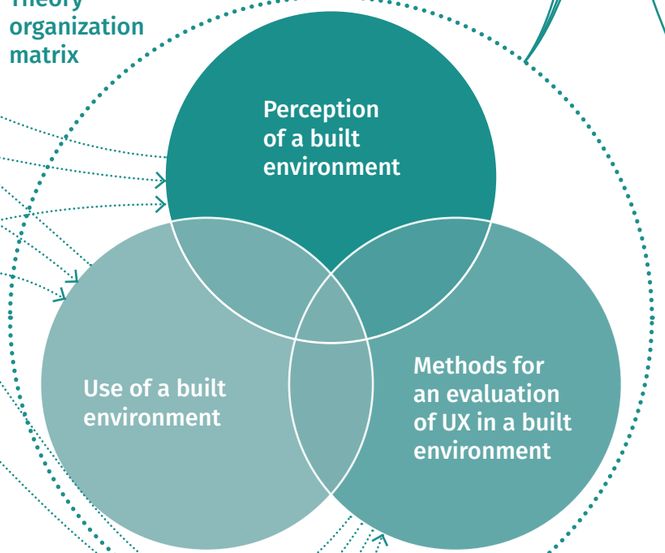
Psychology/sociology

Neuroscience

VR

UX Research

Theory organization matrix



New design typologies

Answers

Localizing the problem

Understanding the problem

Targeting the problem

UX of Arch

Figure 6: Research Diagram – Overview

Research areas

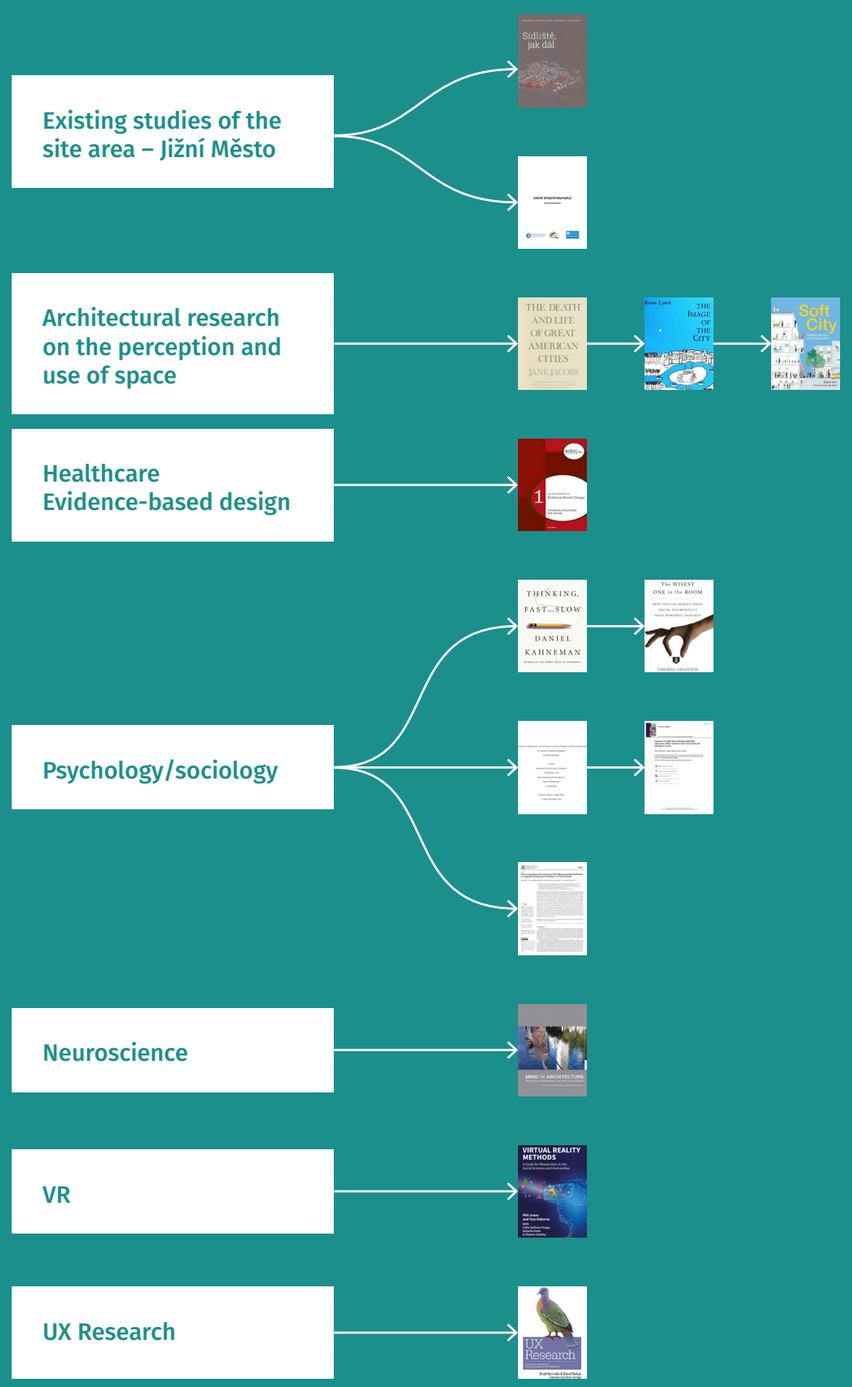


Figure 7: Research Diagram – Research areas

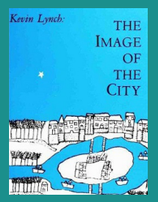
An Introduction to Evidence-Based Design: Exploring Healthcare and Design

Downside of Building Up: An Exploration into the Psychological and Physiological Impacts of Exposure to High-Rise Buildings

Dráhy bydlení mileniálů

Millennials' housing trajectories

The Image of the City

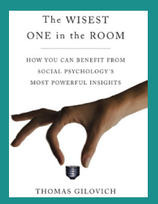


Exposure to High-Rise Buildings Negatively Influences Affect: Evidence from Real World and 360-Degree Video

The Living Space: Psychological Well-Being and Mental Health in Response to Interiors Presented in Virtual Reality

Mind in Architecture: Neuroscience, Embodiment, and the Future of Design

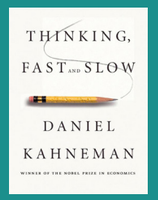
The Wisest One in the Room: How You Can Benefit from Social Psychology's Most Powerful Insights



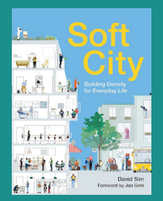
Sídliště, jak dál?

Housing estates, what's next?

Thinking, Fast and Slow

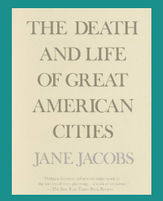


Soft City: Building Density for Everyday Life



UX Research: Practical Techniques for Designing Better Products

The Death and Life of Great American Cities



Virtual Reality Methods: A Guide for Researchers in the Social Sciences and Humanities

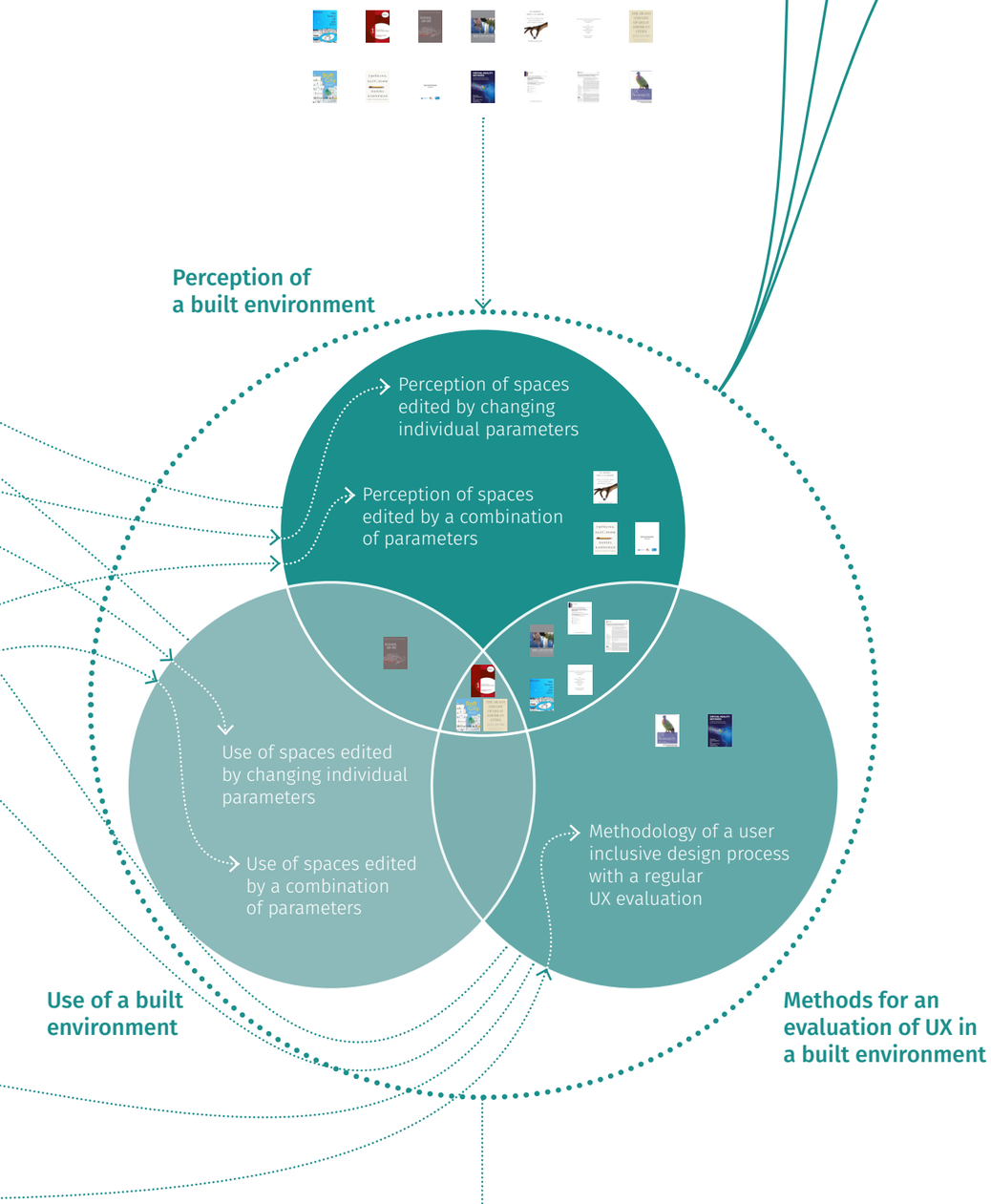


Figure 8: Research Diagram – Theory organization matrix

Argument on relevance

The fundamental problematics of the UX in the built environment is crucial for the field even though the direct findings of this research may not yet have a broader application due to its limited scale. No matter which urbanized environment on the planet we would consider, understanding and addressing the needs and desires of users with high precision is critical for the development of a sustainable future. We may talk about concepts using strategies like densification, greenification, reduction, degradability, or circularity for tackling ecological issues, but without an environment that people find comfortable or even exciting to live in, these concepts will be eventually abandoned. Abandoned 'sustainable' construction is ultimately unsustainable. The union between the desires of all individual users and the 'desires' of the natural environment on a global scale is, therefore, crucial to achieve. Consequently, studies on methodologies and designs to do so should be of primary interest – where could they lead us in the future?

When the tech giant Apple announced the release of their newest product 'Vision Pro' in June 2023, it promised to bring revolution to the way we interact not only with technologies but the world itself. Under the newly coined term 'spatial computing', Apple promised a fluent integration of a virtual and real environment creating a new environmental experience for itself.[38,39]

Critically speaking, this vision is probably still far from reality. Even though the product brings undeniable advancements to its competitors, the still 'bulky' physical appearance is too strong of a border for human-like interactions.[40,41]

Nonetheless, the original vision is certainly intriguing. If such a 'wearable' could become truly integrated into our lives, what could we learn about humans? With a hypothetically unlimited amount of data about individual interactions with the built environment, real or virtual, how much could we learn about a single user? How could we find an 'ideal' built environment for all users? Could it become timeless? Or on the contrary, how much more individually optimized could the built environment become? How much could it react to emerging trends? How well could it deflect potential threats? How well could it evolve?

Figure 9: In a world where VR/AR headset would become an everyday wearable like suggests Apple with its product 'Vision Pro', how much more could we learn about users and their interaction with the built environment? [42]
[Apple, Using Apple's Vision Pro Mixed Reality Headset to Take Meetings While Working from Home.]

[38] "Introducing Apple Vision Pro."
[39] "Apple Vision Pro."
[40] Knibbs, "Apple's Vision Pro Isn't the Future."
[41] Sorrel, "Is Vision Pro the Future of Computing, or a Dystopian Mind Prison?"
[42] "Introducing Apple Vision Pro."

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Architectural research on the perception and use of space

Jacobs, Jane. *The Death and Life of Great American Cities.* Vintage Books ed. New York: Vintage Books, 1992.

A direct and fundamentally optimistic indictment of the short-sightedness and intellectual arrogance that has characterized much of urban planning in this century, The Death and Life of Great American Cities has, since its first publication in 1961, become the standard against which all endeavors in that field are measured.

In prose of outstanding immediacy, Jane Jacobs writes about what makes streets safe or unsafe; about what constitutes a neighborhood, and what function it serves within the larger organism of the city; about why some neighborhoods remain impoverished while others regenerate themselves. She writes about the salutary role of funeral parlors and tenement windows, the dangers of too much development money and too little diversity.

Lynch, Kevin. *The Image of the City.* 33. print. Publication of the Joint Center for Urban Studies. Cambridge, Mass.: M.I.T. Press, 2008.

The classic work on the evaluation of city form. What does the city's form actually mean to the people who live there? What can the city planner do to make the city's image more vivid and memorable to the city dweller? To answer these questions, Mr. Lynch, supported by studies of Los Angeles, Boston, and Jersey City, formulates a new criterion-imageability-and shows its potential value as a guide for the building and rebuilding of cities. The wide scope of this study leads to an original and vital method for the evaluation of city form.

Sim, David, and Jan Gehl. *Soft City: Building Density for Everyday Life.* Washington ; Covelo ; London: Island Press, 2019.

Imagine waking up to the gentle noises of the city, and moving through your day with complete confidence that you will get where you need to go quickly and efficiently. Soft City is about ease and comfort, where density has a human dimension, adapting to our ever-changing needs, nurturing relationships, and accommodating the pleasures of everyday life. How do we move from the current reality in most cites--separated uses and lengthy commutes in single-occupancy vehicles that drain human, environmental, and community resources--to support a soft city approach? In Soft City David Sim, partner and creative director at Gehl, shows how this is possible, presenting ideas and graphic examples from around the globe. He draws from his vast design experience to make a case for a dense and diverse built environment at a human scale, which he presents through a series of observations of older and newer places, and a range of simple built phenomena, some traditional and some totally new inventions. Sim shows that increasing density is not enough. The soft city must consider the organization and layout of the built environment for more fluid movement and comfort, a diversity of building types, and thoughtful design to ensure a sustainable urban environment and society. Soft City begins with the big ideas of happiness and quality of life, and then shows how they are tied to the way we live. The heart of the book is highly visual and shows the building blocks for neighborhoods: building types and their organization and orientation; how we can get along as we get around a city; and living with the weather. As every citizen deals with the reality of a changing climate, Soft City explores how the built environment can adapt and respond. Soft City offers inspiration, ideas, and guidance for anyone interested in city building. Sim shows how to make any city more efficient, more livable, and better connected to the environment

Healthcare – Evidence-based design

Malone, Eileen. *An Introduction to Evidence-Based Design: Exploring Healthcare and Design.* The Center for Health Design, n.d.

An Introduction to Evidence-Based Exploring Healthcare and Design Guide One explores the history and evolution of evidence-based design (EBD) through its present definition and defines the key steps of the EBD process. Once the context is set, the guide will explore the components of the healthcare delivery system, the trends affecting it and the various settings in which delivery occurs.

Neuroscience

Robinson, Sarah, and Juhani Pallasmaa, eds. *Mind in Architecture: Neuroscience, Embodiment, and the Future of Design.* First MIT Press paperback edition. Cambridge, Massachusetts London, England: MIT Press, 2017.

Leading neuroscientists and architects explore how the built environment affects our behavior, thoughts, emotions, and well-being.

Although we spend more than ninety percent of our lives inside buildings, we understand very little about how the built environment affects our behavior, thoughts, emotions, and well-being. We are biological beings whose senses and neural systems have developed over millions of years; it stands to reason that research in the life sciences, particularly neuroscience, can offer compelling insights into the ways our buildings shape our interactions with the world. This expanded understanding can help architects design buildings that support both mind and body. In Mind in Architecture, leading thinkers from architecture and other disciplines, including neuroscience, cognitive science, psychiatry, and philosophy, explore what architecture and neuroscience can learn from each other. They offer historical context, examine the implications for current architectural practice and education, and imagine a neuroscientifically informed architecture of the future.

Architecture is late in discovering the richness of neuroscientific research. As scientists were finding evidence for the bodily basis of mind and meaning, architecture was caught up in convoluted cerebral games that denied emotional and bodily reality altogether. This volume maps the extraordinary opportunity that engagement with cutting-edge neuroscience offers present-day architects.

Psychology/Sociology

Gilovich, Thomas, and Lee Ross. *The Wisest One in the Room: How You Can Benefit from Social Psychology's Most Powerful Insights.* Simon and Schuster, 2016.

Renowned psychologists describe the five most useful insights from social psychology that will help make you “wise”: wise about why we behave the way we do, and wise about how to use that knowledge to understand others and change ourselves for the better. When faced with a challenge, we often turn to those we trust for words of wisdom. Friends, relatives, and colleagues: someone with the best advice about how to boost sales, the most useful insights into raising children, or the sharpest take on a political issue. In The Wisest One in the Room, renowned social psychologists Thomas Gilovich and Lee Ross ask: Why? What do these people know? What are the foundations of their wisdom? And, as professors and researchers who specialize in the study of human behavior, they wonder: What general principles of human psychology are they drawing on to reach these conclusions? They find that wisdom, unlike intelligence, demands some insight into people—their hopes, fears, passions, and drives. It’s true for the executive running a Fortune 500 company, the candidate seeking public office, the artist trying to create work that will speak to the ages, or the single parent trying to get a child through the tumultuous adolescent years. To be wise, they discover, one must be psych-wise when dealing with everyday challenges. In The Wisest One in the Room Gilovich and Ross show that to answer any kind of behavioral question, it is essential to understand the details—especially the hidden and subtle details—of the situational forces acting upon us. Understanding these forces is the key to becoming wiser in the way we understand the people and events we encounter, and wiser in the way we deal with the challenges that are sure to come our way. With the lessons gleaned here, you can learn the key to becoming “the wisest one in the room.”

Kahneman, Daniel. *Thinking, Fast and Slow*. Penguin Psychology. London: Penguin Books, 2012.

In this work the author, a recipient of the Nobel Prize in Economic Sciences for his seminal work in psychology that challenged the rational model of judgment and decision making, has brought together his many years of research and thinking in one book. He explains the two systems that drive the way we think. System 1 is fast, intuitive, and emotional; System 2 is slower, more deliberative, and more logical. He exposes the extraordinary capabilities, and also the faults and biases, of fast thinking, and reveals the pervasive influence of intuitive impressions on our thoughts and behavior. He reveals where we can and cannot trust our intuitions and how we can tap into the benefits of slow thinking. He offers practical and enlightening insights into how choices are made in both our business and our personal lives, and how we can use different techniques to guard against the mental glitches that often get us into trouble. This author’s work has transformed cognitive psychology and launched the new fields of behavioral economics and happiness studies. In this book, he takes us on a tour of the mind and explains the two systems that drive the way we think and the way we make choices.

Mazumder, Robin. “The Downside of Building Up: An Exploration into the Psychological and Physiological Impacts of Exposure to High-Rise Buildings.” University of Waterloo, 2020. https://uwspace.uwaterloo.ca/handle/10012/16504?show=full.

Cities are densifying at a rapid rate and, accordingly, are constructing high-rise buildings to accommodate more people. The aim of this dissertation was to quantify the physiological and psychological impacts of being in the presence of high-rise buildings. Study 1, which used computer-generated environments and immersive virtual reality, demonstrated that environments populated by high-rise buildings were rated as more oppressive and less open than environments populated by low-rise buildings. In Study 2a, using similar measures, the effects of high-rise buildings a real-world setting in Central London were examined, finding that people rated the high-rise building to be less open and rated themselves to be less happy when exposed to them, as compared to being exposed to the low-rise building. In Study 2b, 360-degree video of the same setting was used in Study 2a and which participants were exposed to using a head mounted device. Participants rated the high-rise building environment to be less open, less friendly and rated themselves to feel less happy and have less sense of control, as compared to low-rise buildings. In Study 3, 360-degree photos were used to examine the effect of distance from high-rise buildings on valence, arousal, sense of control, and openness ratings. Results from Study 3b indicated people were happier, calmer and had a greater sense of control, the further they were from the high-rise. Study 4 examined how exposure to multiple high-rise buildings affected electrodermal activity and valence, arousal, sense of control, and openness. Exposure to high-rise buildings yielded higher electrodermal activity. Taken together, these experiments suggest that exposure to high-rise buildings can have a negative impact on cognition, affect, and physiology. Furthermore, these experiments provide an array of methodologies that can be used to understand the psychological impacts of urban design, a topic which warrants further inquiry as our world continues to urbanize.

Mazumder, Robin, Hugo J. Spiers, and Colin G. Ellard. “Exposure to High-Rise Buildings Negatively Influences Affect: Evidence from Real World and 360-Degree Video.” Cities & Health 6, no. 6 (November 2, 2022): 1081–93. https://doi.org/10.1080/23748834.2020.1839302.

Cities are densifying at a rapid rate, and accordingly, are constructing high-rise buildings to accommodate more people. The aim of this study was to quantify the physiological and psychological impacts of being in the presence of high-rise buildings in Central London, in a real and virtual 360-degree video environment. Using a within-subjects design, participants were exposed to a low-rise and high-rise building. While exposed, participants were monitored for electrodermal activity. They were also administered the Self-Assessment Manikin measure and a cognitive appraisal questionnaire. Participants rated the high-rise building environment to be less open, less friendly and rated themselves to feel less happy and have less sense of control, as compared to low-rise buildings. We found these effects in both the real world (n = 16) and a 360-degree video setting (n = 121). These findings suggest that city environments populated with high-rise buildings can have negative impacts on urban dwellers. Furthermore, this study provides a methodology to examine how individuals respond to the built environment and stand to inform urban design and architectural practices.

Tawil, Nour, Izabela Maria Sztuka, Kira Pohlmann, Sonja Sudimac, and Simone Kühn. "The Living Space: Psychological Well-Being and Mental Health in Response to Interiors Presented in Virtual Reality." *International Journal of Environmental Research and Public Health* 18, no. 23 (January 2021): 12510. https://doi.org/10.3390/ijerph182312510.

There has been a recent interest in how architecture affects mental health and psychological well-being, motivated by the fact that we spend the majority of our waking time inside and interacting with built environments. Some studies have investigated the psychological responses to indoor design parameters; for instance, contours, and proposed that curved interiors, when compared to angular ones, were aesthetically preferred and induced higher positive emotions. The present study aimed to systematically examine this hypothesis and further explore the impact of contrasting contours on affect, behavior, and cognition. We exposed 42 participants to four well-matched indoor living rooms under a free-exploration photorealistic virtual reality paradigm. We included style as an explorative second-level variable. Out of the 33 outcome variables measured, and after correcting for false discoveries, only two eventually confirmed differences in the contours analysis, in favor of angular rooms. Analysis of style primarily validated the contrast of our stimulus set, and showed significance in one other dependent variable. Results of additional analysis using the Bayesian framework were in line with those of the frequentist approach. The present results provide evidence against the hypothesis that curvature is preferred, suggesting that the psychological response to contours in a close-to-reality architectural setting could be more complex. This study, therefore, helps to communicate a more complete scientific view on the experience of interior spaces and proposes directions for necessary future research.

The UX of Jižní Město and panel construction housing in the Czech Republic

Kouhout, Michal. *Sídliště, jak dál?* Prague: České vysoké učení technické v Praze, 2016. https://www.kavkabook.cz/p/sidliste-jak-dal.

Approximately one-third of the population of the Czech Republic lives in housing estates today, and in Prague it is even less than half. So far, we as a society have focused on individual buildings and their construction-technological standard in revitalisation projects and have not paid much attention to finding a long-term strategy for the development of these locations.

What next? What should the long-term vision of these areas look like? How to enter them conceptually and how to start the process of their gradual transformation into an attractive part of the urban fabric? How to limit the risks of future negative development? The publication summarizes the results of the research of the same name and is divided into three parts: the introductory theoretical part is devoted to the analysis of the background of settlement development and a general summary of the possibilities of its further development. The second part presents 18 model studies and 2 pilot projects for the adaptation of specific sites in Czech cities. The last part of the publication is devoted to data summaries and graphical comparisons: it contains the results of analyses of the examined sites of Czech housing estates, comparisons of individual case studies and an overview of the most interesting European examples of housing estate regeneration from the last 25 years.

Lux, Martin, Petr Sunega, and Petr Kubala. "Dráhy bydlení mileniálů." Prague: Sociologický ústav AV ČR, 2021. https://seb.soc.cas.cz/attachments/article/133/TZ_Dr%C3%A1hy%20bydlen%C3%AD%20mileni%C3%A1l%C5%AF.pdf.

The press release presents the first results of a unique questionnaire survey that was conducted during October-December 2020 and focused on the topic of housing from the perspective of young people aged 18-35 in four selected cities in the Czech Republic. The questionnaire survey was conducted as part of the research project "Millennials' Housing Trajectories: the Growing Tension between the Normalization of Ownership Housing and the Deteriorating Affordability of Housing in the Czech Republic" and was co-authored by Martin Lux, Petr Sunega, Petr Kubala and Tomáš Hoření Samec.

UX Research

Nunnally, Brad, and David K. Farkas. *UX Research: Practical Techniques for Designing Better Products.* 1st ed. Beijing Boston Farnham Sebastopol Tokyo: O'Reilly, 2017.

One key responsibility of product designers and UX practitioners is to conduct formal and informal research to clarify design decisions and business needs. But there's often mystery around product research, with the feeling that you need to be a research Zen master to gather anything useful. Fact is, anyone can conduct product research. With this quick reference guide, you'll learn a common language and set of tools to help you carry out research in an informed and productive manner.

This book contains four sections, including a brief introduction to UX research, planning and preparation, facilitating research, and analysis and reporting. Each chapter includes a short exercise so you can quickly apply what you've learned.

- Learn what it takes to ask good research questions.
- Know when to use quantitative and qualitative research methods.
- Explore the logistics and details of coordinating a research session.
- Use softer skills to make research seem natural to participants.
- Learn tools and approaches to uncover meaning in your raw data.
- Communicate your findings with a framework and structure.

VR

Jones, Phil, and Tess Osborne. *Virtual Reality Methods: A Guide for Researchers in the Social Sciences and Humanities.* Bristol: Policy Press, 2022.

Since the mid-2010s, virtual reality (VR) technology has advanced rapidly. This book explores the many opportunities that VR can offer for humanities and social sciences researchers. The book provides a user-friendly, non-technical methods guide to using ready-made VR content and 360° video as well as creating custom materials. It examines the advantages and disadvantages of different approaches to using VR, providing helpful, real-world examples of how researchers have used the technology. The insights drawn from this analysis will inspire scholars to explore the possibilities of using VR in their own research projects.

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In 2017, a global survey conducted by the paper maker GF Smith suggested 'Marrs Green' to be the 'world's favorite color'. Chosen through an online survey out of 30,000 submissions from more than 100 countries, the color should have "simultaneous warmth and coolness to it, feeling somehow inviting and absorbing," as its author, Annie Marrs, explains.[43,44]

Where Annie Marrs explored colors, I explored architecture with the same effort of finding the most enjoyable human experience. As a symbolic manifestation of this 'collaboration', the Marrs Green color became your guide through the research plan – like a green light beacon illuminating important phrases and navigating throughout the journey.

[43] Hooton, "A Deep Teal Is the World's Favourite Colour, According to Survey."
[44] Brewer, "The World's Favourite Colour Winner Announced as Marrs Green."

I hate how it looks all the same.
I always liked how organized it feels here.
I wish I could move once to that area.
There's just nothing to do around here.