

Designing OWN,

The Inner World as a Virtual Space:
By and For Introspection



Nurturing the inner world of emotions, thoughts, and self is essential to our well-being. However, the abstract and invisible nature of the inner world makes it difficult for people to sense and manage. Then, what if people build their own virtual world where they can introspect inner sides? This pictorial presents the creation process of 'OWN', a personal virtual space where users, the OWNers, can explore and interact with their inner world. As part of the co-creation process, each OWNer expresses a personal narrative about themselves and their surroundings, allowing psychologists to gain an in-depth insight into their world. The psychologists' analysis of the OWNer's inner state suggests various elements that the designer visualizes as space in the virtual world. By designing OWN with expressive activities, OWNers were able to reflect more deeply on their lives. OWN then became a virtual oasis where OWNers could relax, reflect, and improve themselves.

Authors Keywords

Interaction design, Creative practice, Virtual space, Introspection

CSS Concepts

•Human-centered computing~Human computer interaction (HCI)

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ABSTRACT



INTRODUCTION

"How are you?" "I'm fine, thank you. And you?"

This daily greeting between countless people asks each other if they are well. This common daily exchange where we ask one another about our well-being often comes out of habit. But how often do we pause to sincerely reflect on the question, 'Am I all right?'. Introspection is a psychological process of looking inward to one's inner world including thoughts, emotions, and perceptions, which is a pathway to well-being [1, 2, 3, 4]. However, due to the abstract and invisible nature of the inner side, navigating it is challenging. With the growing interest in personal well-being in Human-Computer Interaction and Design Research, much research has proposed methods that allow people to effectively understand themselves through self-tracking [5, 6], the mindfulness meditation [7, 8, 9], and interaction with digital tools such as conversational agents [10].

Most research to support introspection depends on experts such as psychologists and designers, which allows for the design of reliable and practical methods. However, each person's inner world is unique, and inner perception is possible through one's own deliberation, attention, and reflection [11]. Therefore, the process of genuine introspection requires the active participation not only of external professional parties but also of the individual as a subject. It also requires a personalized and holistic design approach to fully understand each individual's different inner state. To this end, we have developed a new way to explore the inner side through a co-design process as a stage of the user's introspection.

In this pictorial, we present a project to design 'OWN', a tailored virtual space, by and for active introspection. Each user actively participated in the design process by expressing their personal narrative—stories of their own life experiences [45], specifically about themselves and their environment. These narratives, indicators of their inner states, served as a guide for the creation of OWN.

OWN, THE INNERMOST SPACE

OWN is a virtual oasis designed specifically for one person. It is a place where users can relieve stress and refresh themselves, and where they can experience and introspect their inner world. The key concept of OWN, an elaborate personalized innermost virtual space, is inspired by the words of a philosopher Julia Kristeva [12].

People need each territory for their soul "Inner Zone - Secret Garden"

OWN is filled with various therapeutic visual and spatial elements suggested by the analysis of the user's inner state by researchers, which makes OWN as an extended concept of restorative environment. The restorative environment is the theoretical concept of designing a real or virtual environment to promote people's well-being by allowing them to recover in it [46]. However, it has mainly focused on adopting external elements, such as natural images [47], rather than internal elements that are closely related to the user. Therefore, in order to promote users' introspection, we selected all the elements that make up OWN based on a deep understanding of each person's personal narrative.

OUR CONTRIBUTION

- Propose a co-design process to build OWN, tailored to the user's inner world and based on actively expressed personal narratives
- Explore the potential of the design process as a way to introspection
- Identifying positive effects of the innermost virtual space, OWN, on introspection

THE OWNER

To design the innermost personal space, OWN, our researchers of a designer and two psychologists (a clinical and counseling psychologist and an art therapist) recruited users. Recruitment was via online communities and messenger, and three users were in contact with the researchers. We refer users to OWNer, an owner of OWN. Our target group was those who did not have a severe mental problem requiring clinical intervention. The table below gives details of three OWNers who took part in our project.

Nickname	Age	Gender	Job
Mindelle	26	Female	Artist
MYN	25	Non-binary	Graduate Student
T	24	Female	Undergraduate Student



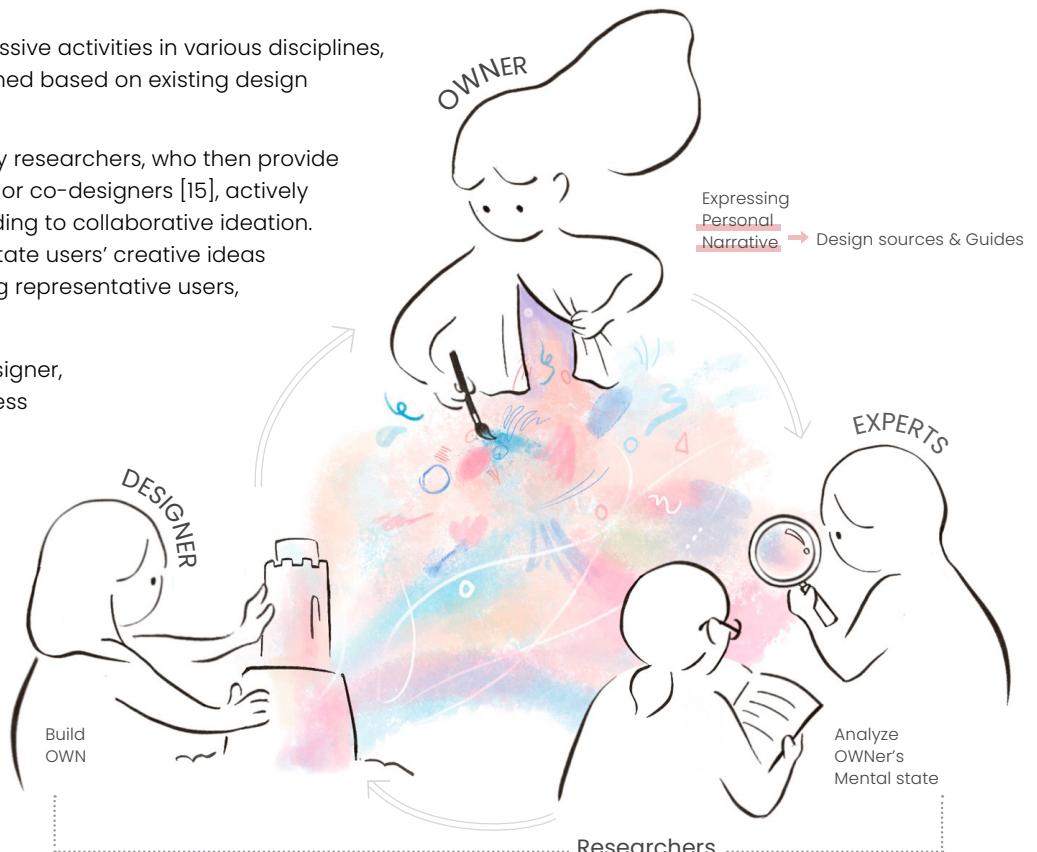
DESIGN PROCESS

We constructed a design process that induces OWNer introspection by studying expressive activities in various disciplines, such as art therapy. In addition, the role of each member of the design team was defined based on existing design research approaches.

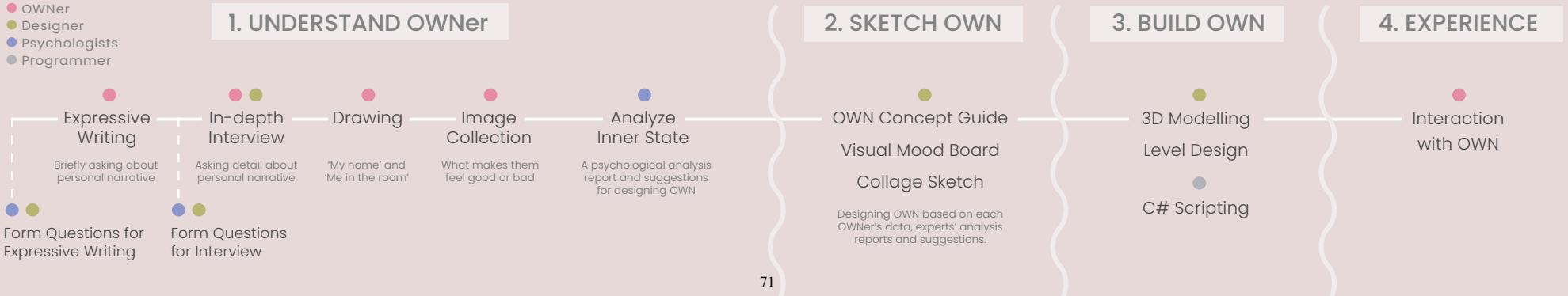
In classical user-centered design (UCD), users are passively observed and analyzed by researchers, who then provide insights to designers [13]. In co-design, users, as psychologists of their experiences [14] or co-designers [15], actively contribute to the design process alongside researchers, producing resources and leading to collaborative ideation. Researchers, including designers and specialists in some disciplines, plan how to facilitate users' creative ideas for design goals [13]. Both methods aim to achieve consensus based on understanding representative users, ensuring that designs meet a wider range of user needs [16, 17].

Our design goal is to create a virtual space tailored to a single user. Therefore, one designer, one user(OWNER), and two psychologists participated in the design process. This process was repeated in total three times by the same designer, the same psychologists and a different OWNER each time. In the end, we created three different OWN. The OWNER actively participated in the design process with activities that express personal narratives that become design sources and guides for OWN. Similar to classical UCD, the psychologists identified the OWNER's inner state and developed design directions of OWN based on the OWNER's expressions, and this is provided to the designer who builds the OWN. Furthermore, our process is similar to co-design in that we create OWN together through iterative ideation and interaction across all members.

In the design process, the OWNER provides design sources and guides through self-expressive activities that lead to introspection. We used expressive writing, that increases emotional awareness [18,19], individual in-depth interviews, and the self-reflective drawing from art therapy [20]. The OWNER's self-expression is fundamental to creating OWN and initiates the first phase of the design process. Details of the design process, including Mindelle's OWN design example, follow on the next page.



- OWNER
- Designer
- Psychologists
- Researchers



1. UNDERSTAND OWNer

In the first phase, there were four steps: expressive writing, in-depth interviews, drawing, and image collection. Through those expressive activities, the OWNer understands the inner world and provides a design source and guide for OWN. Researchers specifically planned each step, and each OWNer shared their personal narrative accordingly. All activities except the interview were carried out independently to protect the OWNer's privacy and freedom as much as possible. The expressed outcomes were used as clues to analyzing the OWNer's inner state by psychologists.

* Researchers : Designer and psychologists

■ Expressive Writing

Researchers designed questions from which OWNers could easily share their personal narratives. Each OWNer expressively wrote down how they perceived and felt the relationship between self and the environment. An initial analysis of the expressive writing results was carried out and used as a basis for designing in-depth interview questions.

■ In-depth Interview

To ensure the anonymity of each OWNer, the in-depth interview (about two hours, via Zoom) was conducted by a single researcher responsible for communicating with OWNers. The interview questions were developed by researchers, including psychologists. There were two types of questions: the Common Questions, which were asked equally to all OWNers, and the Additional Questions, which were individually tailored based on each OWNer's expressive writing.



Common Questions about..

- * How to define yourself: self-image
- * Perspective on travel: the way to escape from daily stressful situation
- * Repetitive behavioral patterns
- * Psychological reactions to various visual elements (colors, figures..)
- * Feelings and thoughts about own room and possessions.

What situation does make me feel comfortable?

When I feel anxious?

How I think about my room?

How my persona looks like?

: Smiling face. Even if someone is rude to me, I smile.
I'm afraid to be awkward so I just put up with me.

Example of Additional Question

How did you realize that you keep a smile?

When I was a student, a teacher said,
"Why do you smile when you're talking about something that's upsetting?"

My parents also say I smile too much.
I thought I should be nice to everyone.

I want to fix it, and I think I'm getting better these days.



Drawing

OWNer drew 'Home' and 'Me in the Room' for about 10 minutes to express how each OWNer felt about their inner self and outer environment. This was a variation of the House-Tree-Person (HTP) test [20], often used in art therapy, and the art therapist interpreted OWNer's drawings. In addition, the psychological and visual elements expressed in the drawings, such as the structure and scale of the space, became a guide for the designer in creating the visual concept of OWN.

Suggestions from Art Therapist

A structure that can be protected from the outside and left free inside is essential

A balance between immersion in personal exploration and external communication is necessary: Positioning the clock to induce self-regulation of immersion.

*self-regulation: any efforts to change and manage one's behavior [48]

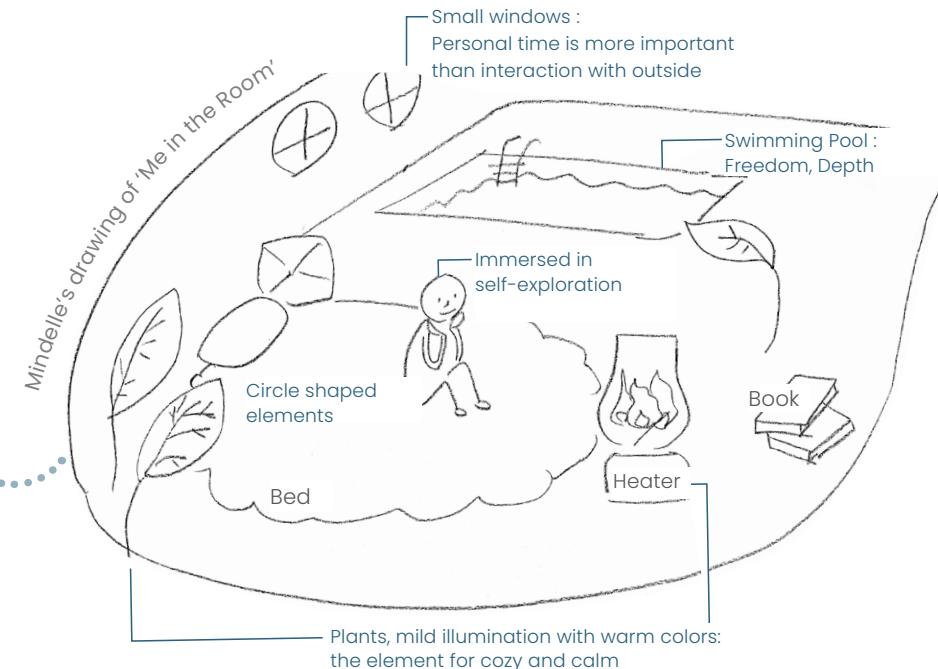
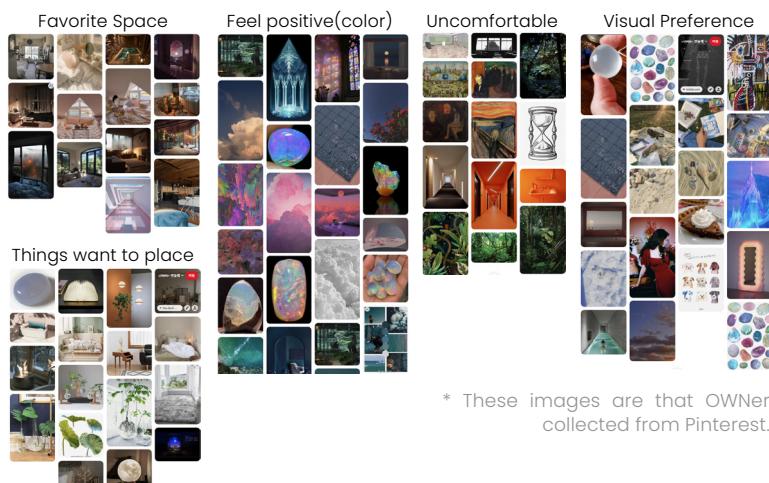
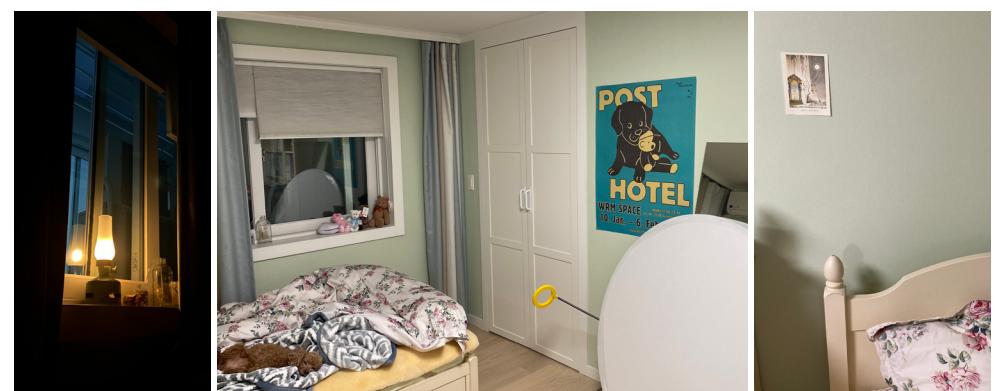


Image Collection

Each OWNer collected various images of visual and spatial elements that feel positive or negative, such as colors, objects, and interiors.



Each OWNer provided the researchers with photos and floor plans of their personal space to support personal narratives of their physical and psychological experiences in a space.



■ Analyze Inner State

The psychologists analyzed in depth the inner state and the behavior of interaction with the external environment based on self-expression of the OWNer.



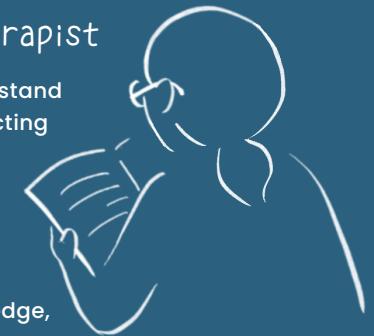
Clinical and Counseling Psychologist

Provide psychological analysis report as

1. Daily Life
2. Interpersonal Relationships
3. Strengths and Weaknesses
4. Psychological Needs
5. Necessary Interventions

Art Therapist

Interpret drawings to understand OWNer's psychological reacting patterns to visual and spatial elements.



Suggest visual design elements based on a wide range of art therapy knowledge, such as color therapy.

2. SKETCH OWN

The second phase is the process of sketching OWN. The designer establishes the overall visual concept of OWN, the virtual inner space, as a free and limitless dream world without the physical constraints of the real world.

■ OWN Concept Guide

First, the designer wrote the design concept guide of OWN. The guide summarizes the OWNer's various expressed personal narratives, analysis reports, and design suggestions from psychologists. Moreover, the designer mapped symbolic visual elements that would fill OWNer's inner world, which is requisite for better emotional well-being as well as those of OWNer's preference. Those elements based on knowledge of color psychology, environmental psychology, and art therapy were reviewed by psychologists.

*Emotional well-being: a positive balance between pleasant and unpleasant experiences that affect overall life satisfaction [49].

OWN Concept Guide

Summary of psychological analysis

- Own time and space is the most important : Bed, Mood lighting, Diary, Book
- Too much pay attention in other's opinion Small window: aim loose relationships
- Enjoys thinking with the mood lighting in calm atmosphere of Night ~ Dawn time
- Desires to express pressured emotion : Express by art / Dreaming freedom

Requisites for Emotional Well-being

- The space where could only focus herself : Dark green or blue can imagine the deep sea
- The most comfortable space, bed is a door of deep the thought : She can swim in the wide sea of thoughts
- Should keep balance not sink into the abyss : Clock - an alarm when to get out of there

■ Visual Mood Board

The designer made a visual mood board based on the concept guide. The board contains images collected by OWNer during the first phase, as well as various visual references collected by the designer. The background image on this page shows a part of visual mood board for Mindelle's OWN.

3. BUILD OWN

Designer implemented a **3D virtual space**, OWN, based on the final sketch consulted by psychologists and OWNer. OWN was developed using the Unreal Engine, a game engine [41]. It supports real-time rendering, which makes OWN come alive with 3D motion, such as wind and water flow, and allows OWNer to explore the inner world freely.

OWN consists of two spaces in total. One is in the form of a **Cozy Room** with walls or doors that are bordered by other spaces. The other is an **Infinite Space** that can be immersed in the OWNer's contemplation. When entering OWN, OWNer is located in the *Cozy Room*. Through certain parts within it, OWNer can be transported to *Infinite Space*. The division of OWN into two layers is intended to allow OWNer to go down deeper into the inner self.

Moreover, a **simple text annotation** appears near important visual symbol elements so OWNer can reflect on self. For example, next to an hourglass in Mindelle's OWN is the sentence: 'It reminds when to go back to don't sink too deeply into own time.'

To build OWN, a programmer was invited to work with the designer to create moving and interacting features by C# scripting. The designer created 3D assets in Blender [42] and some supported Unreal assets such as <Megascans> from Quixel [43] and <Corals 2> by DmitriyDryzhak [44]. Royalty-free licensed pieces of music were used. The build supports Windows and is played using a keyboard and game controller.

■ Collage Sketch

Technique that creates new feeling by placing familiar and realistic objects in unfamiliar locations

Technique that creates new image by combining separate pieces

Since OWN is an inner world that the OWNer cannot experience in the physical real world, the designer sketched OWN using **Collage** and **Depaysement**, visualization techniques of an art movement, Surrealism. The sketch was modified and supplemented by feedback from psychologists and OWNer. Psychologists checked whether the sketch reflected their suggestions without distortion, while OWNers gave comments based on their feelings about it and preferences.



Sketch of Mindelle's OWN

Infinite Space



Cozy Room



MYN's OWN

Cozy Room

Bunch of Negative Memories

Face and accept it that has been avoided



Big window

Revitalized by social communication

Guitar

Express emotion and thinking by arts

Brown and Soil

Reduce obsessive thought

Evening Sunshine

Get a positive energy and looks back on the day

Go for a walk!

Infinite Space



Gradients and intermediate colors

good for reducing dichotomous thinking

T's OWN

Cozy Room

Strong Sense of Control

Easy to blame self when failing or stressed

Should practice to know the contribute and controllable range

Fantastic Space

Stimulates innocence of childhood inside

Infinite Space

Color of Clear Sky

Makes feel happy

Enter the mirror !

Library and Bed

Rest calm and recharge of 'Trying Power'

Treasure Box

Where true self, time, and space are protected

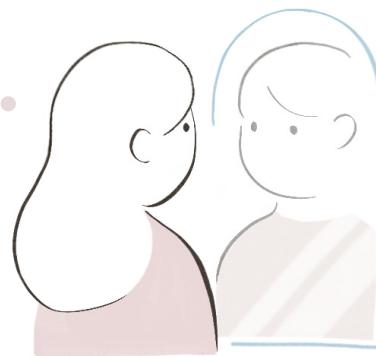
Door to outside

Wants to express self and be recognized by others

Design Process as Introspection

After each OWNER was provided with OWN, a one-hour post-interview was conducted individually via Zoom. In the post-interview, we asked OWNER:

1. Their perception of their role in the design process
2. Insights gained from expressive activities
3. The way they understood the inner world using OWN
4. Their relationship with OWN



Interaction with Inner World, OWN

Our design outcome, OWN, is a virtual space completely tailored to the state of each OWNER's inner world, and we expected it to have a positive effect on OWNers' introspection and emotional well-being.



Peaceful and Heal the Mind

Make feel positive about experiences in real life.

"OWN comes up in my mind when I see a clear evening sunset or a city that is similar to the view outside the window in OWN. So I look forward to that moment every day."

"I used to think that 'my life is over' when I was estranged from someone. But now I can accept the change of relationship more composed since there is OWN where I can go to heal myself anytime."



Impacts on Life Afterward

"I realized that I liked bluish-green, so I started adding many bluish-green things to my room."

"Through this experience, I became more courageous about showing myself."

Reliable and Valuable Experience with Experts

"OWN was completely focused on me and delicately made so it was very amazing and touching. I was really grateful."

"With experts, the design process and outcome were reliable. The world was created with consistency reflecting me."

"I expressed myself comfortably to trustworthy experts. I'm not good at visualization, so I was satisfied that the designer building my OWN."

OWN is filled not only with the positive things OWNers prefer but also with the necessary elements suggested by expert analysis to improve their emotional well-being

Guide to reflect on self and get better growth constantly

"The hourglass that keeps me from falling into my own thoughts was so impressive."

"Whenever I enter OWN, I think that I should develop the good and improve the bad by looking at myself objectively and visually"



DISCUSSION

Designing Own Methods By and For Introspection

Active efforts at introspection and growth are the most necessary for emotional well-being [3, 21]. Therefore, having introspective methods and learning how to manage the inner world is needed for persistent wellness. Most existing work on self-perception on the inner state in HCI mainly focused on how technology augments the automatic detection of emotions [22, 23, 24]. Although those effectively help users to reflect on themselves, it is hard to engage users in sustained use [24, 25].

Since people feel more attached to what is tailored to them [26] and what they have actively contributed to the design process [27], designing their own methods for introspection can lead to long-term sustainable interactions. Also, the process of people expressing themselves through active engagement using their own cognitive capabilities is a vital part of mental well-being [28], even as more technical support is developed. Therefore, as our pictorial presented, it is necessary to study more about the self-directed process of design approach by and for introspection.



We also expect that this exploratory process can be applied to the current situation of patients with serious mental health problems. However, our project was aimed at people who did not require pathological treatment, and to be clinically relevant, mental health specialists' advice and intervention are essential. Further research is needed on the role and extent of specialists in mental health involvement in the design process. Understanding how users should interact with psychologists in self-directed design for mental well-being is also essential.

Virtual World, A Canvas for Expanding Perception

We exist in space. Space is where we do our daily activities, and interaction with different parts of space, including objects, floors, and walls, affects our emotions, actions, and cognitive decisions [29, 30, 31, 32]. With the development of digital technology, the range of spaces where people exist and interact has expanded from the physical to the virtual world. As many HCI researchers have studied interactions in virtual environments, and it has identified that various experiences, such as education and therapy, in a virtual environment are more effective than doing it in real life [33, 34, 35] and safer from dangerous situations that occur in reality [36, 37].

Most of the studies have implemented the virtual world as similar to the physical world that we are familiar with [38, 39, 40]. However, as we identified in this pictorial, the virtual world, which is free from the physical constraints of reality, is a canvas that enables us to embody something difficult to perceive and interact with in reality, such as our inner world. More research is needed to explore how the virtual world's distinct potential might extend our perception and experience. Research on novel spatial design strategies and guidelines for the virtual world is also essential, in addition to applying aesthetical, psychological, and architectural knowledge that is used to design the physical space.

FUTURE WORKS

OWN was created based on an analysis of the inner state of OWNers at a particular time. As each OWNer's inner world changes throughout their lives, OWN should evolve into a "virtual oasis" that reflects their inner state at that moment. To make this possible, future work would include working with psychologists to develop an analysis system to support the continuous updating and expansion of OWN. In addition, by allowing OWNers to directly modify parts of their virtual space as needed, we expect to increase their sense of immersion and emotional attachment to OWN.

CONCLUSION

This pictorial proposes the design process of a virtual inner space, OWN, created to facilitate introspection. Through a co-design process involving a single user (OWNer), a designer, and psychologists, the design of OWN was personalized to each OWNer's inner world and psychological needs. As the fundamental phase of designing OWN, expressive activities such as writing, drawing, and interviews elicit OWNer's personal narratives to promote introspection. The tailored-designed virtual space, OWN, incorporating therapeutic elements suggested by psychologists, serves as a field of reflection and improvement of the OWNer's inner world for emotional well-being. Introspection is enabled through active engagement of users, not just relying solely on external parties, such as experts and technical data collection. Moreover, to persistently engage individuals in introspection, further research about their role in self-directed design processes is suggested. We also highlight the potential of the virtual world where the new experience could be embodied.

REFERENCES

- [1] Smithies Declan. 2012. A Simple Theory of Introspection. In Declan Smithies & Daniel Stoljar (eds.), *Introspection and Consciousness*. Oxford University Press.
- [2] Sharma Manoj, Kanekar Amar, Batra Kavita, Hayes Traci, and Lakhan Ram. 2022. Introspective Meditation before Seeking Pleasurable Activities as a Stress Reduction Tool among College Students: A Multi-Theory Model-Based Pilot Study. *Health-care*, 10(4):614. <https://doi.org/10.3390/health-care10040614>
- [3] Kendra Cherry. 2023. Introspection and How It Is Used In Psychology Research. Retrieved February 9, 2023 from <https://www.verywellmind.com/what-is-introspection-2795252>
- [4] Joyce S. Anthony and McCallum Mary. 2004. Assessing patient capacities for therapy: psychological-mindedness and quality of object relations. Mahwah: Lawrence Erlbaum Associates Publishers.
- [5] Eikey V. Elizabeth, Caldeira M. Clara, Figueiredo C. Mayara. et al. 2021. Beyond self-reflection: introducing the concept of rumination in personal informatics. *Pers Ubiquit Comput* 25, 601–616. <https://doi.org/10.1007/s00779-021-01573-w>
- [6] Yixin Wang, Yun Suen Pai, and Kouta Minamizawa. 2022. It's Me: VR-based Journaling for Improved Cognitive Self-Regulation. In *SIGGRAPH Asia 2022 Posters (SA '22)*, Article 45, 1–2. <https://doi.org/10.1145/3550082.3564196>
- [7] Yoko Akama, Ann Light, and Simon Bowen. 2017. Mindfulness and Technology: Traces of A Middle Way. In Proceedings of the 2017 Conference on Designing Interactive Systems (DIS '17), 345–355. <https://doi.org/10.1145/3064663.3064752>
- [8] Joan Sol Roo, Renaud Gervais, Jeremy Frey, and Martin Hachet. 2017. Inner Garden: Connecting Inner States to a Mixed Reality Sandbox for Mindfulness. In Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI '17), 1459–1470. <https://doi.org/10.1145/3025453.3025743>
- [9] Jingjin Li, Nayeon Kwon, Huong Pham, Ryun Shim, and Gilly Leshed. 2023. Co-designing Magic Machines for Everyday Mindfulness with Practitioners. In Proceedings of the 2023 ACM Designing Interactive Systems Conference (DIS '23), 1630–1647. <https://doi.org/10.1145/3563657.3595976>
- [10] Wanling Cai, Yucheng Jin, Xianglin Zhao, and Li Chen. 2023. "Listen to Music, Listen to Yourself": Design of a Conversational Agent to Support Self-Awareness While Listening to Music. In Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI '23), Article 119, 1–19. <https://doi.org/10.1145/3544548.3581427>
- [11] Rosenthal, D.M. 2000. Introspection and Self-Interpretation. *Philosophical Topics*, 28, 201–233.
- [12] Kristeva Julia. 1995. *New Maladies of the Soul*. Columbia University Press.
- [13] Sanders Elizabeth B.-N. and Pieter J. Stappers. 2008. Co-creation and the new landscapes of design, *CoDesign*, 4:1, 5–18, <https://doi.org/10.1080/15710880701875068>
- [14] Visser S. Froukje, Stappers J. Pieter, Remko van der Lugt, and Sanders Elizabeth B.-N. 2005. Contextmapping: experiences from practice. *CoDesign*, 1 (2) : 119 – 149 . <https://doi.org/10.1080/15710880500135987>
- [15] Fischer Gerhard. 2002. Beyond "Couch Potatoes": From Consumers to Designers and Active Con-tributors. *First Monday*, 7(12). <https://doi.org/10.5210/fm.v7i12.1010>
- [16] Michael Muller, David R. Millen, and Carol Strohecker. 2001. What makes a representative user representative? a participatory poster. In *CHI '01 Extended Abstracts on Human Factors in Computing Systems (CHI EA '01)*, 101–102. <https://doi.org/10.1145/634067.634129>
- [17] Andrew Sears and Vicki Hanson. 2011. Representing users in accessibility research. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '11), 2235–2238. <https://doi.org/10.1145/1978942.1979268>
- [18] Nevine Sultan. 2018. Embodied Self-Care: Enhancing Awareness and Acceptance Through Mindfulness-Oriented Expressive Writing Self-Disclosure, *Journal of Creativity in Mental Health*, 13:1, 76–91, <https://doi.org/10.1080/15401383.2017.1286277>
- [19] Shane Mcardle. and Richard Byrt. 2001. Fiction, poetry and mental health: expressive and therapeutic uses of literature. *Journal of Psychiatric and Mental Health Nursing*, 8: 517–524. <https://doi.org/10.1046/j.1351-0126.2001.00428.x>
- [20] Buck N. John. 1948. The H-T-P technique; a qualitative and quantitative scoring manual. *Journal of Clinical Psychology*, 4, 317–396. [https://doi.org/10.1002/1097-4679\(194810\)4:4<317::AID-JCLP2270040402>3.0.CO;2-6](https://doi.org/10.1002/1097-4679(194810)4:4<317::AID-JCLP2270040402>3.0.CO;2-6)
- [21] Kwangyoung Lee and Hwajung Hong. 2018. Mind-Navigator: Exploring the Stress and Self-Interventions for Mental Wellness. In Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (CHI '18), Paper 572, 1–14. <https://doi.org/10.1145/3173574.3174146>

- [22] Dana Pavel, Vic Callaghan, and Anind K. Dey. 2011. From self-monitoring to self-understanding: Going beyond physiological sensing for supporting wellbeing, 2011 5th International Conference on Pervasive Computing Technologies for Healthcare (PervasiveHealth) and Workshops, pp. 312–315, doi: 10.4108/icst.pervasivehealth.2011.245999.
- [23] Eun Kyoung Choe, Bongshin Lee, Haining Zhu, Nathalie Henry Riche, and Dominikus Baur. 2017. Understanding self-reflection: how people reflect on personal data through visual data exploration. In Proceedings of the 11th EAI International Conference on Pervasive Computing Technologies for Healthcare (PervasiveHealth '17), 173–182. https://doi.org/10.1145/3154862.3154881
- [24] Christina Kelley, Bongshin Lee, and Lauren Wilcox. 2017. Self-tracking for Mental Wellness: Understanding Expert Perspectives and Student Experiences. In Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI '17), 629–641. https://doi.org/10.1145/3025453.3025750
- [25] Xianghua (Sharon) Ding, Shuhan Wei, Xinning Gui, Ning Gu, and Peng Zhang. 2021. Data Engagement Reconsidered: A Study of Automatic Stress Tracking Technology in Use. In Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (CHI '21). Article 535, 1–13. https://doi.org/10.1145/3411764.3445763
- [26] Ruth Mugge, Jan P.L. Schoormans, and Hendrik N.J. Schifferstein. 2009. Emotional bonding with personalised products, Journal of Engineering Design, 20:5, 467–476, https://doi.org/10.1080/09544820802698550
- [27] Sukriye S. Atakan, Richard P. Bagozzi, and Carolyn Yoon. 2014. Make it Your Own: How Process Valence and Self-Construal Affect Evaluation of Self-Made Products. Psychol. Mark., 31: 451–468. https://doi.org/10.1002/mar.20707
- [28] Janine Hodge. 2022. What is self-expression and why is it so important?. Article. (24 June 2022.). Retrieved February 9, 2024 from <https://www.counselling-directory.org.uk/memberarticles/what-is-self-expression-and-why-is-it-so-important>
- [29] Kim, So-Young, and Park, Soo-Been A Study on the Characteristics of Interior Design of Space for Child Psychiatric Therapy. The Journal of the Korean Institute of Interior Design
- [30] Raylc, †, Friedman, N., Zamfirescu-Pereira, J., and Ju, W. 2020. Agents of Spatial Influence: Designing incidental interactions with arrangements and gestures.
- [31] Shemesh, A., Talmon, R., Karp, O., Amir, I.Z., Bar, M., and Grobman, Y.J. 2017. Affective response to architecture – investigating human reaction to spaces with different geometry. Architectural Science Review, 60, 116 – 125.
- [32] Kwon Young Gull, & Park Ja Eun. 2005. A Study on the Therapeutic Color Design Method in Residential Space. Journal of Korea Society of Color Studies, 19(2), 11–20.
- [33] Riva, G., & Serino, S. (2020). Virtual Reality in the Assessment, Understanding and Treatment of Mental Health Disorders. Journal of Clinical Medicine, 9.
- [34] Navarro-Haro, and M. V., et al. 2017. "Meditation Experts Try Virtual Reality Mindfulness: A Pilot Study Evaluation of the Feasibility and Acceptability of Virtual Reality to Facilitate Mindfulness Practice in People Attending a Mindfulness Conference". PLOS ONE, 12(11), e0187777.
- [35] Allcoat, D., Hatchard, T., Azmat, F., Stansfield, K., Watson, D., and von Mühlenen, A. 2021. Education in the Digital Age: Learning Experience in Virtual and Mixed Realities. Journal of Educational Computing Research, 59(5), 795–816. https://doi.org/10.1177/0735633120985120
- [36] Bouchard, S., Dumoulin, S., Robillard, G., Guitard, T., Klinger, É., Forget, H., and Roucaut, F. X. 2017. Virtual reality compared with in vivo exposure in the treatment of social anxiety disorder: A three-arm randomised controlled trial. British Journal of Psychiatry, 210(4), 276–283. doi:10.1192/bjp.bp.116.184234
- [37] Opriş, D., Pintea, S., García-Palacios, A., Botella, C., Szamosközi, Ş., and David, D. 2012. Virtual reality exposure therapy in anxiety disorders: a quantitative meta-analysis. Depress Anxiety, 29: 85–93. https://doi.org/10.1002/da.20910
- [38] Ali Almutawa and Ryoko Ueoka. 2019. The Influence of Spatial Awareness on VR: Investigating the influence of the familiarity and awareness of content of the real space to the VR. In Proceedings of the 2019 3rd International Conference on Artificial Intelligence and Virtual Reality (AIVR 2019). 26–30. https://doi.org/10.1145/3348488.3348502
- [39] Rachel R. Feinberg, Udaya Lakshmi, Matthew J. Golino, and Rosa I. Arriaga. 2022. ZenVR: Design Evaluation of a Virtual Reality Learning System for Meditation. In Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems (CHI '22). Article 567, 1–15.
- [40] Crescent Jicol, Christopher Clarke, Emilia Tor, Rebecca M Dakin, Tom Charlie Lancaster, Sze Tung Chang, Karin Petrini, Eamonn O'Neill, Michael J Proulx, and Christof Lutteroth. 2023. Realism and Field of View Affect Presence in VR but Not the Way You Think. In Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI '23). Article 399, 1–17. https://doi.org/10.1145/3544548.3581448
- [41] Unreal Engine. accessed 21 May 2024, <https://www.unrealengine.com/en-US>

- [42] Blender. accessed 7 April 2025, <https://www.blender.org/>
- [43] Quixel MEGASCANS. accessed 7 April 2025, <https://quixel.com/megascans/home>
- [44] DmitriyDryzhak. Corals 2. accessed by 7 April 2025. <https://www.fab.com/listings/99161cf4-c2b9-4b66-aa16-ff9481435270>
- [45] Langellier, K. M. 1989. Personal narratives: Perspectives on theory and research. *Text and Performance Quarterly*, 9(4), 243–276. <https://doi.org/10.1080/10462938909365938>
- [46] Hartig, T. 2004. Restorative environments. *Encyclopedia of applied psychology*, 3, 273–279. <https://doi.org/10.1016/B0-12-657410-3/00821-7>
- [47] Li, H., Dong, W., Wang, Z., Chen, N., Wu, J., Wang, G., & Jiang, T. 2021. Effect of a Virtual Reality-Based Restorative Environment on the Emotional and Cognitive Recovery of Individuals with Mild-to-Moderate Anxiety and Depression. *International Journal of Environmental Research and Public Health*, 18(17), 9053. <https://doi.org/10.3390/ijerph18179053>
- [48] Hagger, M. S. 2010. Self-regulation: an important construct in health psychology research and practice. *Health Psychology Review*, 4(2), 57–65. <https://doi.org/10.1080/17437199.2010.503594>
- [49] Langeland, E. (2022). Emotional Well-Being. In: Maggino, F. (eds) *Encyclopedia of Quality of Life and Well-Being Research*. Springer, Cham. https://doi.org/10.1007/978-3-319-69909-7_859-2