

Drama Therapy in Virtual Reality: A Study on Session Design and Empathy Improvement ^{*}

Yoriko Matsuda^{1,*}, Yutaro Hirao¹, Monica Perusquía-Hernández¹, Hideaki Uchiyama¹ and Kiyoshi Kiyokawa¹

¹Nara Institute of Science and Technology, 8916-5, Takayama, Ikoma, Nara 630-0192, Japan

Abstract

Drama therapy is a form of group psychotherapy that uses improvised drama to help people learn how to interact with others. However, drama therapy faces issues such as a shortage of therapists, feeling of embarrassment about acting, and restrictions on venues. For this reason, we aim to develop XR-based drama therapy (XRDT) using an AI therapist in XR spaces. First, we examined the content of XRDT sessions in a self-created world in VRChat. From the content analysis of the questionnaires and interviews, we observed an improvement in cognitive empathy, where the participants softened their own ideas by considering others, and the effectiveness of the XRDT sessions was demonstrated.

Keywords

drama therapy, virtual reality, empathy, perspective-taking, metaverse, content analysis

1. Introduction

1.1. Background

In recent years, lifestyles and values have become more diverse. The way people interact with others has also changed significantly, along with shifts in how we perceive social identity and a sense of community. In such a society, people are making efforts to understand others. However, many people also feel anxiety, worry, and stress about their social lives. According to a survey by the Japanese Ministry of Health, Labour and Welfare, more than 50% of Japanese workers live with stress. Of these, 70% consult their family, friends, superiors, or colleagues about their problems. In contrast, less than 10% of people choose to consult a specialist such as an occupational physician or a telephone counseling service [1]. In other words, there is a tendency in Japan to try to solve problems and stress through self-help efforts, without relying on specialists. Moreover, many of these efforts do not lead to a real solution to the problem. Given this background, it is necessary to appeal to society at large for a new approach that enables individuals to solve problems in a fundamental way using concrete and quantitative

methods, and to break away from the situation where problems are temporarily and partially solved by consulting with people close to them, a tendency that stems from the Japanese temperament [2]. We have therefore focused on drama therapy, which promotes psychological transformation.

1.2. What is Drama Therapy

Drama therapy is a form of group psychotherapy and expressive arts therapy that was derived from psychodrama, which was proposed by Jacob Moreno in the 1920s, and its framework was established in the UK and US in the 1970s [3]. Participants become scriptwriters, actors, and spectators in drama therapy and achieve psychological transformation through the power of improvisation [4]. Psychological transformation cannot be achieved unless one's thinking is flexible, and this requires understanding and empathy for others. In drama therapy, participants cultivate the ability to imagine the perspectives and feelings of others (cognitive empathy) by repeatedly experiencing role-taking (perspective-taking) and movement imitation (mirroring) using fairy tales and familiar topics as material (Figure 1). In our previous research, we analyzed the experiences of alcoholics undergoing drama therapy and obtained results that allowed us to qualitatively evaluate the effectiveness of drama therapy [5].


1.3. Current Issues and Goals for Solutions

Drama therapy, with its playful elements, is a form of art therapy that can be easily accessed. To make drama therapy available to those seeking self-help, we aim to establish a foundation for its widespread adoption and

APMAR'24: The 16th Asia-Pacific Workshop on Mixed and Augmented Reality, Nov. 29-30, 2024, Kyoto, Japan

*Corresponding author.

✉ matsuda.yoriko.nb4@is.naist.jp (Y. Matsuda);
yutaro.hirao@is.naist.jp (Y. Hirao); m.perusquia@is.naist.jp
(M. Perusquía-Hernández); hideaki.uchiyama@is.naist.jp
(H. Uchiyama); kiyo@is.naist.jp (K. Kiyokawa)
ORCID 0009-0004-4169-1001 (Y. Matsuda); 0000-0003-3546-3454
(Y. Hirao); 0000-0002-0486-1743 (M. Perusquía-Hernández);
0000-0002-6119-1184 (H. Uchiyama); 0000-0003-2260-1707
(K. Kiyokawa)

 © 2024 Copyright for this paper by its authors. Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0).

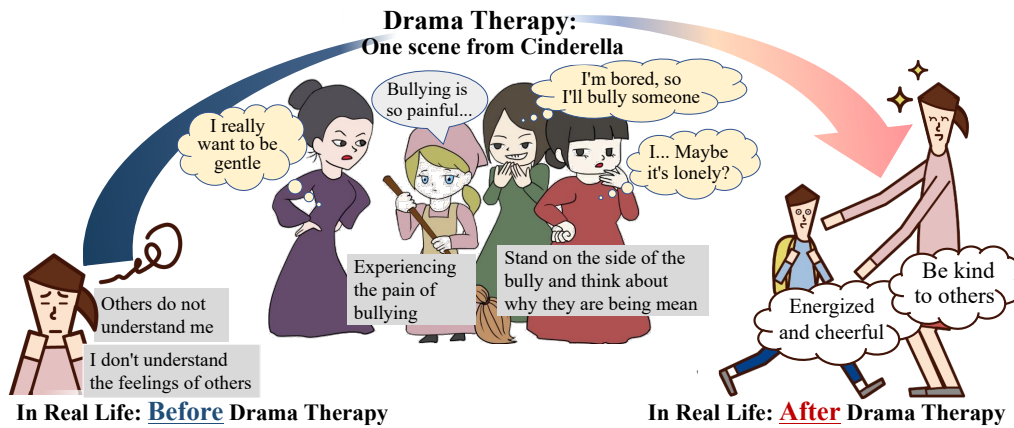


Figure 1: Improving cognitive empathy through drama therapy

explore a highly versatile new therapeutic format. Thus, we will identify the current challenges in drama therapy and propose XR-based solutions. To popularize drama therapy in Japan, three main issues need to be addressed: (1) the limited number of qualified drama therapists (currently only five nationwide) makes it difficult to hold sessions across the country; (2) travel costs and time can be burdensome for those living far from session locations; and (3) cultural inhibitions related to shame make voluntary participation challenging for many. A contributing factor is the lack of drama education in Japanese schools, unlike in Western countries [6]. As solutions to these challenges, we aim to develop XR Drama Therapy (XRDT), which involves an AI therapist (Solution 1), sessions held in the metaverse (Solution 2), and a game-like experience (Solution 3). XRDT will provide a metaverse where anyone can easily engage in drama therapy, offering a tool to cultivate cognitive empathy essential for building relationships.

2. Related Research

2.1. VR Technology and Psychotherapy

VR technology is already being used in psychological therapy in medical facilities and nursing care support facilities [6], and it is particularly well-suited to cognitive behavioral therapy compared to other forms of psychological therapy, with many cases of research and implementation [7]. This is because cognitive behavioral therapy may not generalize effectively with a limited number of practice sessions, and self-guided practice using VR has proven to be effective. Due to the spread of COVID-19, online sessions using Skype and other meth-

Issue 1	Solution 1
Only 5 qualified drama therapists in Japan	Introduce AI therapists
Issue 2	Solution 2
Sessions only held in urban areas	Hold sessions in the Metaverse
Issue 3	Solution 3
Japanese people unaccustomed to acting	Incorporate game-like elements into therapy

Figure 2: Research-based solutions to current issues

ods have become more common in drama therapy [8]. In addition, an attempt has been made to provide effective and easy-to-use therapy for children with autism spectrum disorder using the AEDLE interface, which combines drama therapy and AR [9]. There is also a study that conducted a literature survey on the potential of virtual drama therapy and proposed a methodology [10], but it did not address technical novelty. This research aims to utilize the characteristics of VR and to achieve technical novelty and progress, differentiating it from these studies. Since many drama therapists tend to emphasize face-to-face sessions, the number of studies is still small compared to other psychotherapies. However, interest in the fusion of drama therapy and AR or VR technology is beginning to grow.

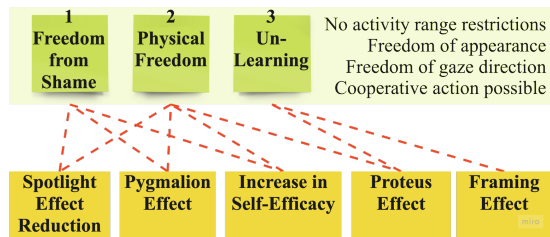


Figure 3: Expected psychological transformation from XRDT

2.2. The potential of XRDT

XRDT is designed to be used in conjunction with VR technology to enable home training in real life. Therefore, we can speculate on the advantages of XRDT, which cannot be obtained in physical space, as shown in Figure 3. There are many research cases of the Proteus effect, which states that the appearance of an avatar in virtual space affects the user’s behavioral characteristics and cognition [11], and it is expected that XRDT will also improve self-efficacy through the Proteus effect. In addition, Kinoshita discusses the theatricality of cyberspace, arguing that what actors, game players, and spectators have in common is that they experience a transformation of their personality through identification with “others” [12]. Based on these findings, it is predicted that the Proteus effect will be observed in XRDT participants, who can freely view their own appearance and performance while participating in the session, and that their behavior in physical space will be activated. In addition, in recent years, the number of educational sites operated in virtual space has increased, and phenomena such as increased student activity compared to real schools have been observed [13]. This indicates that the Pygmalion effect, in which performance improves due to the expectations of others, is likely to be more apparent in virtual space. In XRDT, non-player characters (NPCs) positioned as spectators, providing reactions similar to live spectators are a positive presence, as they laugh and express their agreement with the participants’ performance, so it is expected that the Pygmalion effect will occur in the participants. Furthermore, in XRDT, participants can experience processes such as Unlearn (zeroing out learning) and Relearn (relearning), which encourage self-growth through adaptation to change. We expect that these psychological effects and processes inherent in XRDT will cause psychological transformation in participants by acquiring perspective-taking and improving cognitive empathy.

3. XRDT Development

The purpose of this study is to develop XRDT and to implement and validate it in the metaverse.

3.1. Composition and Elements of XRDT

In drama therapy, techniques such as mirroring and role-switching are used to bring about a sense of identification and other effects that are particularly pronounced when performed by multiple people. Therefore, assuming the minimum configuration, the members would be: one user, one AI therapist, and three other participants (NPCs). The XRDT consists of three sessions: Warm-up, Main Work, and Cool-down. Each session must be designed to make the user feel the benefits of XRDT more strongly, as shown in Figure 3. Furthermore, XRDT is not just about being better than real-space therapy. It aims to be a system that integrates cognitive science, machine learning, wearable computing, and other technologies into psychotherapy. The progressive nature of XRDT lies in its aim to improve human-computer interaction through the recognition and generation of non-verbal information. Paralinguistic information, such as fillers, and physical behavior, such as pauses and hand gestures, are difficult to express in text. However, these account for more than 50% of human communication, including emotional messages [14]. In addition, non-verbal communication is the most difficult aspect for actors, and is the core of expressive power, a skill that captivates audiences. In other words, it can be said that people’s emotions are swayed by non-verbal information, and psychological transformation is promoted. In recent years, affective computing has focused on developing systems that work with emotional application technology and social behavioral science [15]. In addition, mental health applications that provide cognitive behavioral therapy through conversations with users and promote the alleviation of depressive symptoms [16] and therapy robots for the care of the elderly [17] have been put into practical use. In XRDT, we aim to introduce these technologies by focusing on pauses first among the many non-verbal information.

3.2. Research Procedure

In XRDT, it is necessary to create an environment in which conversations are held with an AI therapist. In this study, we divided the research into three stages and proceeded incrementally. First, as the first stage, we examined the content of the sessions that could be held in a virtual space based on drama therapy theory (Phase 1). Next, we created the AI therapist and learned how to have conversations with it (Phase 2). Then, non-verbal information is obtained and given to the AI therapist

(Phase 3). In this paper, we report on our examination of the content of XRDT sessions, which is Phase 1 of the three phases of this research.

4. Examination of XRDT Session Contents

4.1. Experiment Environment

The world in VRChat used for Phase 1 was created by downloading the HomeKit (VRChat SDKTemplate) materials from the Unity Asset Store and processing them in Unity. VRChat is a platform that allows users to freely interact with avatars online. The head-mounted display (HMD) used by the participants was the Meta Quest Pro from Oculus VR, while the research collaborators and the first author used the Meta Quest2 from Oculus VR.

4.2. Experiment Participants and Location

Four participants took part in the experiment, and one session was conducted for each participant. Prior to the experiment, each selected a friendly, informal name for use during the session to foster a relaxed, engaging atmosphere. One session involved a total of five people: one participant, one facilitator (the first author), and three collaborators. There were four participants in total (two men and two women) in their 20s to 70s (Mean age = 40.5 years, SD = 15.69), all of whom were healthy and had experience receiving face-to-face drama therapy. The participants were also qualified as clinical psychologists or certified psychological counselors and had obtained a master's degree in psychology. The three research collaborators participated in all sessions. The research collaborators had experience in stage acting and had also participated as research collaborators in the first author's previous study [5]. Participants were informed of the research collaborators' backgrounds beforehand. The experiment was conducted in a classroom at the university for the participants and the facilitator (first author), and at the homes of the research collaborators, who connected to VRChat from their respective locations.

4.3. Ethical Approval

The research content was explained to four participants and three research collaborators, and informed consent was obtained (ethics approval number: 2022-I-62).

4.4. Experiment Method

The XRDT session was conducted in three phases: Warm-up, Main Work, and Cool-down. This was planned according to the theory of face-to-face drama therapy.

4.4.1. Warm-up

Three playful activities were conducted to help the participants and research collaborators (hereafter referred to as "participants") relax and prepare for Main Work to come. (1) Participants were asked to answer the question "What color is your mood?" by comparing their physical and mental state at the start of the session to a color. This approach was chosen because it is easier to verbalize than describing one's mood using adjectives, and participants were less likely to be at a loss for a response. (2) Participants were then asked to name things they were not good at, and the facilitator (first author) looked for commonalities among the participants' responses. This allowed all participants to share something in common, with the intention of promoting a sense of closeness (increased intimacy through the sharing of personal details). (3) Participants expressed their level of agreement with the topic presented by the facilitator (first author) using the size of their hand gestures, followed by a discussion about each other's expressions. This activity was expected to relieve tension by encouraging participants to observe each other.

4.4.2. Main Work

The participants performed three drama works. (A) In a scene where they discussed the habit of watching SNS and impulsive online shopping, the participants experienced being caught between two research collaborators, who were divided into those who agreed and those who disagreed. (B) A scene of interpersonal trouble that could occur in everyday life was reenacted. First, two research collaborators acted as the person who could not follow the rules and the person who called them out. Next, the participant took on the role of the person who called them out, following the same scenario (Figure 4). In the same scene, the avatar of the person who could not follow the rules was changed to another avatar, and the scene was re-enacted. (C) The research collaborators improvised two scenes based on the role of the fairy tale character Cinderella. The participants did not speak, but instead overlaid their avatar on the role being played by the research collaborators, allowing them to experience various perspectives

4.4.3. Cool-down

Cool-down allowed participants to refresh and reflect on their lives without being trapped in the roles they played in Main Work. First, they did the "mood color" exercise again, which they had done as Warm-up. Participants were able to become aware of changes in their mood by comparing the colors they chose before the session with the colors they chose afterward. The changes in the participants' moods were recorded and used as a reference

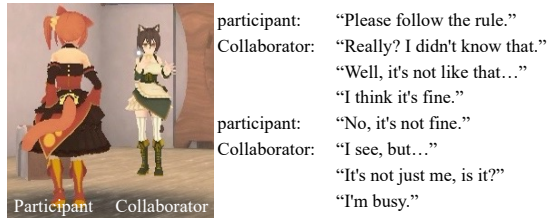


Figure 4: Partial Content of Main Work B

for future support systems. Reflection was a time for participants to express what they felt or wanted to convey, and the aim was to gain self-awareness by looking at oneself objectively. In this experiment, participants were encouraged to discuss their feelings, including reflections, in the semi-structured interview conducted after the session.

4.5. Evaluation Method

4.5.1. Questionnaire

To check whether there were any problems with the experience in the VR environment, we conducted a pre- and post-questionnaire survey using a questionnaire. The questionnaires used were the SSQ (Simulator Sickness Questionnaire) [18] for VR sickness, the VEQ (Virtual Embodiment Questionnaire) [19] for bodily sensation, and the IPQ (Igroup Presence Questionnaire) [20] for presence. In addition, two questionnaires were used to measure the degree of empathy for others: the Inclusion of Other in the Self (IOS) [21] and the Empathy scale. The IOS scale evaluates the psychological distance between oneself and the target person, consisting of two questions. Empathy is a seven-point Likert scale that asks about the degree of empathy felt for the target person, and consists of seven questions for each of Main Work A, B, and C, for a total of 21 questions. These scales were translated into Japanese by Sawada et al. [22] based on the English questionnaire used in a previous study [23], and the items were modified for use in this experiment.

4.5.2. Semi-structured Interview

The participants were interviewed in a semi-structured interview after the experiment. Based on questions about the differences between face-to-face drama therapy and XRDT, and the suitability of VR environments and drama therapy, the interview was conducted flexibly, with additional questions asked to further explore the participants' thoughts and feelings. A verbatim transcript of the recorded and transcribed interview audio was prepared as text data. A team of three individuals, consisting of two analysts and the first author, coded the text data

using the qualitative data analysis software MAXQDA. The coding process was repeated several times, with each coder working on the data on different days. The first author then compared the results of the three coders, classified the codes into themes, and conducted a content analysis. In addition, the research collaborators were interviewed using a semi-structured interview format on the day after the second session. The interview audio was recorded and transcribed to create a verbatim transcript.

5. Experimental Results and Discussion

This experiment did not include any control conditions, such as responses to questionnaires by non-participants. Therefore, the experimental results are presented in the form of an analysis comparing responses to questionnaires by participants before and after the experiment, and a content analysis, which is a qualitative data analysis of semi-structured interviews.

5.1. SSQ-VEQ-IPQ

Of the four participants, one showed symptoms of VR sickness, and one showed symptoms of eyestrain immediately after the experiment, but there were no problems with their health afterward.

5.2. IOS-Empathy

We compared the responses to the questionnaires before and after the experiment for IOS and Empathy. As a result, there were clear changes in the responses of all four participants on several items in the Empathy questionnaire. For this reason, we conducted a separate interview to determine the reasons for the changes (Table 1). For example, in response to the question "What do you think of people who don't follow the rules?" a participant who had answered "Not care" before the experiment, answered "Concerned" after the experiment. The reason given for this change was that "I became less indifferent and started to worry about them". Additionally, other participants who had previously responded with "Anxious, Restless" changed their answer to "Not care" after the experiment. This participant explained, "I began to think more deeply about their situation, and my feelings shifted from wanting to interfere to simply watching over them." and, "Since they have found their place, there may be new developments from there, so I no longer feel sorry for them". It is thought that these changes are due to improved cognitive empathy, which leads to psychological transformation.

Table 1
Changes in IOS and Empathy responses before and after the experiment (excerpt)

Questionnaire	Answer		Reasons for change in feelings
	Before	After	
How do you feel about people who are addicted to the Internet	Troubled	Not care	My need to help them turned into quietly watching over
	Pity	Not care	
What do you think of people who don't follow the rules	Not care	Concerned	Know them and stop being indifferent
	Anxious, Restless	Not care	Understanding them eased my anxiety

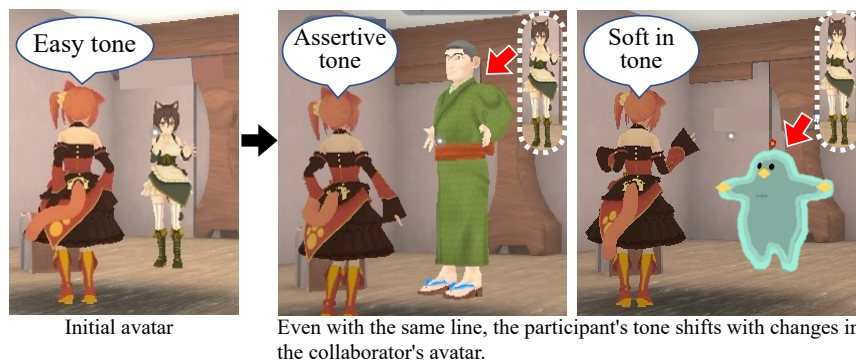


Figure 5: Change in participants due to avatar conversion of collaborator

5.3. Semi-structured Interview

From the content analysis of the semi-structured interviews, we obtained the results that the XRDT session is expected to improve perspective-taking and cognitive empathy and suppress feelings of shame (Figure 5).

5.3.1. Theme Generation and Code Classification

From the interviews of the four participants, Three analysts generated 111 codes during the analysis. The first author derived 13 themes from the 111 codes, and classified each code by theme (Table 2). Then, the percentage of text data for the narratives to which the codes were assigned was calculated using the qualitative data analysis software MAXQDA, and the extent to which each theme was discussed by each participant was quantified (Table 3).

5.3.2. Psychological Benefits of XRDT

The most common thing the participants talked about was “psychological liberation”. The participants identified with the character that their avatar’s appearance

evoked, and enjoyed acting out their roles with boldness. This is probably because, when the participants took part in face-to-face drama therapy, they had experienced refraining from acting as they tried to guess the other person’s facial expressions, or hesitated while searching for the right answer. The XRDT session showed that the participants’ resistance to acting was removed. It could be said that “psychological liberation” is based on “psychological protection”. By wearing the mask of an avatar and protecting their true selves, the participants could suppress their feelings of shame and act boldly. Drama therapy in this kind of psychological state becomes a meaningful session where participants can experience the release of various emotions and experience the drama of diverse interpersonal relationships.

5.3.3. Physical Advantages of XRDT

The next most common themes were “change in viewpoint position” and “sense of presence”. These can be said to be the characteristics of VR. The act of playing a role is, in a sense, an action that is far removed from everyday life, and VR, which immerses you in a different world by isolating you from reality with a head-mounted display,

Table 2
Classification of Codes into 13 Themes (Selected Excerpts)

Code	Theme
Can become one with the character from a first-person perspective	Psychological liberation
VR sickness	Anxiety about VR devices
Cinderella is modern and realistic	Subjects that are easy to imagine
Wanted a more talk-focused session	Examination of Conversation formats
Can move around and control body movements	Interest in VR
Reflected voluntarily based on awareness	Empathy
Did not feel nervous	Psychological protection
No eye contact, gestures, breathing	Dynamic constraints
Become a child's perspective when the character is a child	Change in viewpoint position
World view	Playful experience
Empathy, where an individual identifies with a character's emotions	Mirroring effect
Tension	Sense of presence
Whether the emotional warmth experienced this time can be felt again	Anxiety about AI therapist

Table 3
Percentage of each theme discussed

Theme	Percentage (%)
Psychological liberation	17.96
Change in viewpoint position	16.53
Sense of presence	13.06
Empathy	11.63
Psychological protection	9.39
Interest in VR	7.35
Playful experience	6.53
Subjects that are easy to imagine	5.71
Mirroring effect	5.51
Examination of Conversation formats	3.88
Dynamic constraints	1.22
Anxiety about VR devices	0.82
Anxiety about AI therapist	0.41

is a good match for this. And, because each role has a unique viewpoint (height) that can be easily adjusted by switching avatars, the VR environment is particularly suitable for drama therapy. In addition, since it was the first VR experience for most of the participants, they talked a lot about their "interest in VR", such as how they enjoyed the virtual space and the avatar controls.

5.3.4. Drama Therapy Characteristics

Drama therapy is an expressive arts therapy that aims to cultivate the ability to imagine the perspectives and feelings of others (cognitive empathy) through repeated experiences of role-taking (perspective-taking) and movement imitation (mirroring). We would like to draw attention to the results of the participants who had experienced face-to-face drama therapy, who said that they felt the drama therapy characteristics of "empathy", "playful experience" and "mirroring effect" in XRDT.

5.3.5. Subject of the Session

There was positive feedback about Main Work used in this experiment and the order in which it was presented. The subjects were based on recent internet trends and everyday situations that might occur in social interactions with neighbors, and it was demonstrated that they were accepted regardless of the age or gender of the subjects.

5.3.6. Issues for Consideration

Several issues for consideration were raised. Although they only accounted for a small proportion of the overall interview, we have classified them into four themes that should be considered or examined. (1) "Examination of Conversation formats": Compared to face-to-face drama therapy, the participants mentioned having fewer opportunities to improvise. In addition, some participants felt that the research collaborators' skillful acting outdid them. We will examine the content of the conversation and the length of the lines, and look for a format that will encourage the participants to speak more spontaneously. (2) "Dynamic constraints": One of the participants felt that others were looking down on him because his avatar was short, and he felt oppressed. We will reconsider the settings of the participant avatars while keeping a balance with the physical advantage of XRDT, "change in viewpoint position." (3) "Anxiety about VR devices": One of the participants showed symptoms of VR sickness. There is a possibility that the problem occurred due to the low battery charge of the Head Mounted Display, and we will pay even closer attention in the future to avoid risks such as distortion of the virtual space and falls in the physical space. (4) "Anxiety about the AI therapist": In the work that included self-reflection during Cool-down period, the participants said that they felt the emotional warmth of the participants, and they said that they could

not imagine whether an AI therapist or NPC could create such conversations and actions. This aspect will be a focus of detailed investigation in future research.

5.3.7. Feedback from Research Collaborators

The research collaborators shared their views on the experiment based on their own experience of stage drama. The research collaborators said that while face-to-face drama therapy can be stressful and taxing, it can also lead to powerful realizations and significant healing. Still, achieving the same level of realization and healing in a virtual space may be difficult. For example, if you participate from home, you can go back to reality and do chores or get ready to go out right after the session is over. This ease of access, however, means that there is no lingering effect, and you miss the chance to reflect on what you have experienced. However, the research collaborators said that, because they were not participating in the sessions to gain something from XRDT, their motivation after the experiment would differ from that of the participants. The difference in sensitivity between the participants and the research collaborators was also evident in the change in tone of voice towards the other avatar in Main Work B. When the research collaborators performed Main Work B as a trial, the reaction of all the participants to the avatar whose tone of voice had changed was one of derision and teasing. This suggests that when the operator of the avatar is known, the conversation impression is less influenced by the avatar's appearance. However, when the operator is unknown, the impression formed is largely shaped by the avatar's appearance, including its voice.

5.3.8. Conclusion

The purpose of this experiment was to verify whether the content of the sessions for XRDT that we created had the effect of promoting psychological transformation, such as the acquisition of perspective-taking and the improvement of cognitive empathy. Based on the analysis of the questionnaires and interviews, we can say that these effects are highly promising. We also found that it is possible to generate elements in the virtual space that accelerate psychological transformation, such as the emotional warmth that the participants felt from the research collaborators. However, whether the AI therapist and NPC of the XRDT we aim for can create emotional warmth is an issue for Phase 2 and Phase 3 of this research.

6. Prospects and Future Directions

In Phase 1 (the main experiment) of this research, it was clear that the development of XRDT was promising. In

the future, we will proceed with Phase 2: creating an AI therapist and learning conversation, and Phase 3: acquiring non-verbal information and providing it to the AI therapist, while considering the issues identified in Phase 1. First, we will select a ready-made avatar that meets the conditions for XRDT. Then, using natural language processing technology (NLP) and machine learning algorithms from the OpenAI API, we will embed conversation functions into the avatar. These will be created in the metaverse cluster provided by Cluster, Inc., with whom we are conducting joint research, using the technology provided by Cluster. Then, we will evaluate the AI therapist's movement and conversation ability (Phase 2). Next, we will extract the characteristics of non-verbal information. We are focusing on pauses in particular among non-verbal information. Using data sets such as the Corpus of Everyday Japanese Conversation (CEJC) [24] and the Basic Transcription System for Japanese (BTSJ) [25], we will analyze pauses between conversations from speech detection (Phase 3). Following the coronavirus pandemic, there is a need to create rules for the rapid increase in online counseling (media literacy, ensuring a quiet and appropriate place, prohibition of unauthorized recording, etc.) [26]. Therefore, from now on, this research will be conducted in parallel with empirical research and ethical verification from the initial stage of development.

Acknowledgments

We would like to thank our research collaborators Mika Futagawa, Miyoko Nagao, and Wakana Tsushima. They provided valuable suggestions from the perspective of their experience in acting.

We would like to thank the psychology experts who participated as subjects and coders.

In addition, Professor Sylvia Shueni Pang of the University of London and Assistant Professor Yuji Hatada of the University of Tokyo provided us with multifaceted advice. We are grateful to them.

References

- [1] L. Ministry of Health, Welfare, [reiwa 3rd year labor safety and health survey] reiwa san nen rōdō anzen eisei chōsa (in japanese), Ministry of Health, Labour and Welfare Homepage (<https://www.mhlw.go.jp/toukei/list/r03-46-50b.html>) (2021) 13–16.
- [2] H. Sakamoto, [analysis of self-help, mutual help, and public help consciousness of japanese people] nihonjin no jijō, kyodō, kōjō ishiki no bunseki (in japanese), Seminar Annual Report 2019 (2019) 97–103.

- [3] R. Emunah, *Acting for real: Drama therapy process, technique, and performance*, Routledge, 2019.
- [4] D. R. Johnson, *The theory and technique of transformations in drama therapy.*, *The arts in psychotherapy* 18(4) (1991) 285–300.
- [5] Y. Matsuda, [art-based research on life transformation through drama therapy - what ethnotheatre weaves] *dorama serapī ni yoru jinsei henchō no āto bēsu risāchī-esuno shiatā ga tsumugu mono-* (in japanese), Ritsumeikan University Master's Thesis Collection (2022).
- [6] G. Riva, *Virtual reality in psychotherapy*, *Cyberpsychology & behavior* 8 (2005) 220–230.
- [7] S. A. Nijman, et al., *Dynamic Interactive Social Cognition Training in Virtual Reality (DiSCoVR) for social cognition and social functioning in people with a psychotic disorder: study protocol for a multicenter randomized controlled trial*, *BMC Psychiatry* 19 (2019) 1–11.
- [8] A. Atsmon, S. Pendzik, *The clinical use of digital resources in drama therapy: An exploratory study of well-established practitioners*, *Drama Therapy Review* 6 (2020) 7–26.
- [9] J. Park, et al., *AEDLE: Designing Drama Therapy Interface for Improving Pragmatic Language Skills of Children with Autism Spectrum Disorder Using AR*, in: *Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems*, 2023, pp. 1–7.
- [10] S. F. Jonaghani, *VR Drama Therapy*, Master thesis, University of Toronto, 2023.
- [11] N. Yee, J. Bailenson, *The Proteus effect: The effect of transformed self-representation on behavior*, *Human communication research* 33 (2007) 271–290.
- [12] K. Kinoshita, [toward a theoretical construction of "participant": A preliminary discussion on the applicability of the proteus effect to theater and film studies] *"sanka-sha" no riron kōchiku ni mukete – pūroteusu kōka no engeki eiga kenkyū e no ōyō kanosei ni tsuite no shiron-* (in japanese), *Theater Studies Collection, Bulletin of the Japan Theater Association* 70 (2020) 71–90.
- [13] H. Saito, [the new way of thinking about schools and the shape of education that i felt when i tried to create a school in the metaverse] *meta ba-su ni gakkou wo tuku xtu te mi te kan zi ta atara sii gakkou no a ri kata to kyōuiku no katati* (in japanese), <https://japan.cnet.com/article/35207142/>, 2023.
- [14] M. L. Knapp, J. A. Hall, T. G. Horgan, *Non-verbal Communication in Human Interaction*, Cengage Learning, 2013. Google-Books-ID: rWoWAAAAQBAJ.
- [15] R. W. Picard, *Affective computing: challenges*, *International Journal of Human-Computer Studies* 59 (2003) 55–64.
- [16] A. Darcy, et al., *Evidence of human-level bonds established with a digital conversational agent: cross-sectional, retrospective observational study*, *JMIR Formative Research* 5 (2021) e27868.
- [17] T. Shibata, K. Wada, [clinical and empirical study on the effects of robot therapy using the seal robot "paro"] *azarashigata robotto "paro" ni yoru robotto serapī no kōka no rinshō jishō jikken ni tsuite* (in japanese), *Journal of the Robotics Society of Japan* 29 (2011) 246–249.
- [18] R. S. Kennedy, et al., *Simulator sickness questionnaire: An enhanced method for quantifying simulator sickness*, *The international journal of aviation psychology* 3 (1993) 203–220.
- [19] D. Roth, M. E. Latoschik, *Construction of the virtual embodiment questionnaire (veq)*, *IEEE Transactions on Visualization and Computer Graphics* 26 (2020) 3546–3556.
- [20] J. Vasconcelos-Raposo, et al., *Adaptation and validation of the Igroup Presence Questionnaire (IPQ) in a Portuguese sample*, *Presence* 25 (2016) 191–203.
- [21] A. Aron, et al., *Inclusion of other in the self scale and the structure of interpersonal closeness.*, *Journal of personality and social psychology* 63 (1992) 596.
- [22] R. Sawada, et al., [verification of the transferability of empathy formed by vrpt to specific groups to out-groups] *vrpt ni yori keisei saretā tokutei shūdan e no kyōkan no shūdan-gai e no ten'i kanosei no kenshō* (in japanese), *Proceedings of the Japan Virtual Reality Society Conference* 27 (2022) 3C1–4.
- [23] M. Mado, et al., *Effect of virtual reality perspective-taking on related and unrelated contexts*, *Cyberpsychology, Behavior, and Social Networking* 24 (2021) 839–845.
- [24] H. Koiso, et al., *Corpus of Everyday Japanese Conversation*, CEJC, in: *The 96st Meeting of Special Interest Group on Spoken Language Understanding and Dialogue Processing (SLUD)*, *The Japanese Society for Artificial Intelligence* (2022.12), *The Japanese Society for Artificial Intelligence*, 2022, p. 31.
- [25] M. Usami, *Basic Transcription System for Japanese: BTSJ*, 2019.
- [26] E. Ishikawa, [current status and challenges of online counseling] *onrain kaunsenringu no genjō to kadai* (in japanese), *Bulletin of Kodomo Education Hosen University* 12 (2021) 53–59.