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1 Research Interests

My research aims to use **multimodal data in psychotherapy** to develop optimal analytical models for various information generated during therapy, to elucidate the process of psychotherapy, and to **create AI therapists** to develop new psychotherapies.

1.1 Past Research

The applicant has been conducting research in the field of psychology to elucidate the maintenance and prediction of symptoms of mental illness and other disorders and the transformation process in treatment from multimodal data such as facial expressions (Maeda and Yokotani, 2022; Maeda and Yokotani, 2023).

1.2 Current and planned future research

Current and future research that we are conducting aims to elucidate the process of psychotherapy using multimodal high-resolution data while utilizing the qualifications of licensed psychologists. As background for this study, psychotherapy is in high demand in society, but its effectiveness is only 60%. In recent decades, although enormous amounts of research funds and the time of many researchers worldwide have been devoted to improving the effectiveness of psychotherapy, the effectiveness of psychotherapy has come to a head (Leichsenring et al., 2022). To improve the effectiveness of psychotherapy, it is necessary to "dismantle" psychotherapy and verify the effectiveness of each component（Boschloo et al., 2019）, and multimodal machine learning is effective for this purpose. Therefore, we will establish an analytical model of psychotherapy using a registry(Psychotherapy Registry R-MAP : KAKENHI 22K20312) that stores high-resolution data during psychotherapy, which is owned by the laboratory to which the applicant belongs. We will also apply the obtained model to clinical data to clarify its usefulness in clinical practice.

Furthermore, she is working on the development of AI therapists, aiming to achieve natural communication with patients by utilizing voice interaction technology. With advancements in this voice interaction technology, AI therapists will be able to understand patients' emotions and intentions more accurately and provide personalized treatment anytime and anywhere. Figure 1 shows a demo screen of an actual implementation of an AI therapist, serving as a supportive bot for people experiencing parenting loneliness.

Figure 1 Demo screenshot of the snuggle bot for lonely childcare people.

2 Future of Spoken Dialog Research

In five years, voice dialogue research is expected to achieve further advancements, establishing technologies that enable more appropriate and natural interactions. These technologies will allow for a more accurate understanding of human speech and intentions, and the generation of appropriate responses. In ten years, these technologies are predicted to become widely adopted, with voice dialogue systems being utilized in various aspects of daily life, such as healthcare, education, and entertainment.

In the meantime, young researchers are expected to significantly contribute to improving the accuracy and practical application of voice dialogue systems. Specifically, they will aim to develop systems that can handle diverse languages, dialects, and accents. Additionally, research to improve the usability and safety of voice dialogue systems will be important. Furthermore, by working on the development of multimodal dialogue systems that integrate different modalities (e.g., voice,

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visual, gestures), they can provide a richer user experience.

To achieve the above goals, research on interface design and usability to create easy-to-use and safe dialogue systems will be necessary. Additionally, the development and evaluation of dialogue systems that combine modalities other than voice will be essential. Furthermore, to promote the field, research on the ethical issues and social impacts brought by the widespread use of dialogue systems and measures to address these issues will be indispensable. Through these studies, it will be possible to build the future of voice dialogue research and provide technologies beneficial to society.

3 Suggestions for discussion

- Accurate Detection of Emotions and Intentions and Optimization of Responses: Analytical techniques for understanding emotions and intentions and generating more human-like responses.
- Interface Design: Designing interfaces that affect how users interact with the system (visual and auditory design).
- Interpretation of Emotions and Other Paralinguistic Phenomena: Interpretation of Multimodal Information such as Emotions.

References

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Biographical Sketch

The applicant obtained her Master's degree in Clinical Psychology from the Graduate School of Integrated Arts and Sciences, University of Tokushima, in March 2024. The applicant also earned the national qualification of Certified Public Psychologist in June of the same year. Recognized for her active research activities, innovative ideas, and analytical techniques during her graduate studies, Shio is currently working as the youngest researcher at the International Institute for Integrative Sleep Medicine (WPI-IIIS) at the University of Tsukuba, a research institution selected for the World Premier International Research Center Initiative (WPI) by the Ministry of Education, Culture, Sports, Science and Technology.

At WPI-IIIS, The applicant participates in various projects, including two clinical trials on new psychological therapies for insomnia utilizing technology (jRCT1030210575, jRCT1030210518) and research on the societal implementation of psychological therapies based on implementation science (UMIN000052911), under the Moonshot Research and Development Program titled "Unraveling and Manipulating the Two Types of Sleep: Sleep and Hibernation for New Generation Medical Development." This year, she has also joined as an analyst in the development of next-generation psychological therapies using human augmentation technologies (Grant-in-Aid for Scientific Research (B): 24K00492), contributing to research that is expected to gain international attention. Additionally, the applicant is collaborating with Dr. Francis X. Shen, a leading expert in the Ethical, Legal, and Social Issues (ELSI) of digital mental health, to conduct research on the ELSI of digital mental health. Together, they are planning and conducting patient surveys on AI agents to examine the facilitators and barriers to research data utilization, which is one aspect of Patient and Public Involvement (PPI) (jRCT1030220228).