Title of Project： Ultra-High-Definition Mental Health Care by Digital-Human Integration: New Strategy for utilizing Multi-Modal, Big, and Precision Data

ITO Masaya
(National Center of Neurology and Psychiatry, National Center for Cognitive-Behavior Therapy and Research, Director of Department of Research and Development)

Number of Research Area：21B102　Researcher Number：20510382

【Purpose of the Research Project】

The purpose of this research project is to **provide detailed psychological care using digital technology such as artificial intelligence.**

Mental health is a serious worldwide issue. In particular, depression and anxiety are placing a heavy burden on humanity, causing tremendous suffering. Psychiatry and clinical psychology have accumulated a considerable amount of research and have come to understand the types of psychotherapy that are most effective. However, psychotherapy is not a panacea, and a certain percentage of people do not sufficiently recover. In addition, the training of therapists who provide psychotherapy involves a great deal of time and effort.

Psychotherapy is provided through person-to-person communication, which includes various aspects such as spoken words, voice, facial expressions, and gestures. Until now, psychotherapy research has made little attempt to handle these various aspects as high-resolution digital data. In recent years, attempts to acquire big data, identify certain states, and predict outcomes using artificial intelligence techniques have been carried out in various fields. In this project, we will attempt to use these cutting-edge artificial intelligence techniques to analyze verbal and acoustic data in psychotherapy, which has been little examined in the past, and identify people's mental states and predict psychotherapy outcomes.

【Content of the Research Project】

This project consists of four Planned Research groups and one supporting group. The basic strategy will be to make secondary use of high-quality clinical data collected in clinical trials in which cognitive-behavioral therapy is used to treat depression and anxiety (Grant-in-Aid for Young Scientists (A) 17H04788, 25705018), and to apply artificial intelligence techniques and network analysis to these data.

In Planned Research Group **A01, "Construction of an Ontology that Contributes to the Integration of Multi-Modal, Big, and Precise Data in Psychotherapy,"** we will use an expert-type artificial intelligence approach to organize psychotherapeutic actions as structured knowledge that can be understood by both computers and humans (PI: Takuichi Nishimura, Ph.D.). We aim to organize the vocabulary and build a search system.

Group **A02, "Development of a Psychotherapy Support System Through the Application of Artificial Intelligence Technology to the Analysis of Natural Language,"** will use words (natural language) that are spoken and written in psychotherapy (PI: Yoshitake Takebayashi, Ph.D.). **Group A03, "Application of Artificial Intelligence to the Analysis of Speech Information, for Symptom Identification and Prediction of Treatment Outcome,"** will use speech uttered in psychotherapy (PI: Masaya Ito, Ph.D.). Group A02 and A03 will apply artificial intelligence techniques such as machine learning to the analysis of language and speech data, respectively, to discriminate the mental states of people undergoing psychotherapy and to predict the therapeutic effects of psychotherapy. In Planned Research **A04, "Elucidation of the High-Definition Action Mechanism of Psychotherapy Through Network Analysis,"** we will attempt to elucidate in detail what symptoms are changed by what interventions and through what interactions in the course of psychotherapy by using mathematical statistics for the network theory (PI: Jun Kashihara, Ph.D.).

【Expected Research Achievements and Scientific Significance】

This project aims to support the realization of more detailed psychological care (i.e., ultra-high-definition psychological care) by applying artificial intelligence technology to the analysis of multi-modal, big, and precision psychotherapy data. If the above planned research results in the discrimination of a person's mental state and prediction of treatment outcome, it is expected that this approach will be extended to various aspects (e.g., facial expressions, gestures, biological data). In addition, the technology developed in this area is expected to be applied not only to mental health care, but also to various situations where people communicate with each other (e.g., education, welfare, service industry). The project can also help stimulate research on the use of artificial intelligence technology to enhance the understanding of human communication.

【Key Words】

Ultra-high-definition mental care

An attempt to grasp a person's mental state in detail and to provide mental care based on that mental state.

Integration of digital and human technology in care

An attempt to integrate digital technology and techniques that can only be operated by humans to realize more extensive and reliable care than any single method.

【Term of Project】 FY2021-2023

【Budget Allocation】 105,000 Thousand Yen

【Homepage Address and Other Contact Information】

https://uhd-mental-health-care.jp