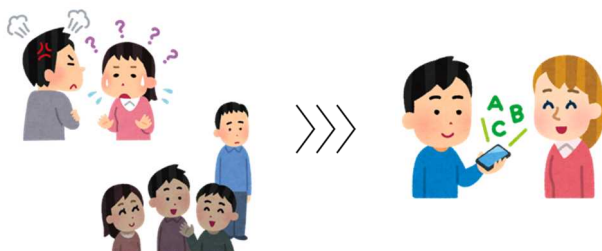


4 / 5. Social implementation of Jizai Hon-yaku-ki (neurodiversity / education)

Progress until FY2023

1. Outline of the project

In R&D items 4 and 5, we analyze and solve problems in Jizai Hon-yaku-ki implemented in the following two contexts. R&D item 4 focuses on using Jizai Hon-yaku-ki as **supported communication, especially involving people with developmental conditions**. While our R&D project is not dedicated specifically to disabled people, it may have the social benefit of improving our communication while respecting neurodiversity.



Communication problems can be alleviated by Jizai Hon-yaku-ki.

R&D item 5 addresses **classroom use of Jizai Hon-yaku-ki for education**. Along with the MEXT initiative to install up-to-date devices for students to utilize in their study, our R&D item 5 aims at providing proof-of-concept cases of educational application.

Close engagement with the relevant parties (like those with developmental conditions, their supporters, children, and teachers) is necessary from the very beginning of our R&D. The common task of these two R&D items is to incorporate their viewpoints to make Jizai Hon-yaku-ki useful to

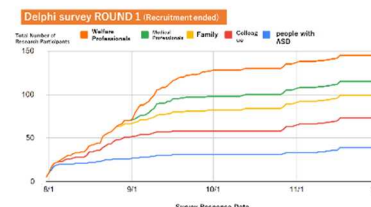
them.

2. Outcome so far

1. Conducted a Delphi survey to deliver stakeholders' voices to researchers and developers
2. Acquisition of EEG/behavior data from individuals with developmental disabilities

Outcome 1: We collected opinions on communication difficulties and ideas for features and functions to be included in the devices from stakeholders and those around them.

The issues were classified into four categories, and the ideas were organized accordingly. In addition to the need to understand others, the need to "understand one's own internal state (mind and body)" was also identified. By sharing and discussing these needs with the research and development team, we are considering which features and functions should be prioritized for inclusion in the "Jizai Hon-yaku-ki."



Communication Difficulties Between People with ASD and Neurotypical Individuals in the Workplace

1. Difficulties in Interpersonal Relationships
 - 1.1 Accessibility of Communication Forms
 - 1.2 Discrimination, Prejudice, and Misunderstanding
 - 1.3 Trauma and Transference
2. Difficulties Due to Sensory Sensitivities
3. Emotional and Physical Difficulties
 - 3.1 Managing Emotions and Health
 - 3.2 Self-Understanding, Excessive Self-Blame, and Excessive Demand for Accommodation
4. Difficulties in Job Performance
 - 4.1 Easily Surprised by Unexpected Situations
 - 4.2 Difficulty Grasping a Big Picture
 - 4.3 Inability to Meet Deadlines
 - 4.4 Challenges with Multitasking and Automation

Ideas for Elements/Functions into Jizai Translation Device Corresponding to Theme Analysis (Partial List)

1. Difficulties in Interpersonal Relationships
 - Providing model answers for words and emotions
 - Analyzing facial expressions and words (speech reading, lip reading, facial expression analysis)
 - Transcribing speech to text
2. Difficulties Due to Sensory Sensitivities
 - Fostering a workplace culture through appropriate education and training to enhance understanding of minorities, including neurodiverse individuals, etc.
3. Emotional and Physical Difficulties
 - Adjusting auditory sensitivity, etc.
 - Displaying physical stress levels
 - Monitoring physical and brain states, etc.
4. Difficulties in Job Performance
 - Monitoring physical and brain states, etc.
 - Supporting verbalization of thoughts and organization of thinking, etc.

Outcome 1 — summary of interim Delphi survey results

Outcome 2: Using the system we have developed that simultaneously records EEG and behavioral data from multiple perspectives with minimal burden, we have measured various physiological and behavioral data from individuals with developmental disabilities. In addition to scalp EEG, we are recording electromyograms (EMG), electrocardiograms (ECG), respiration, and video recordings of behavioral data during developmental psychological assessments. This allows for a more comprehensive analysis of the users' brain activity during interpersonal communication.

So far, we are engaging with potential users — especially those with developmental conditions — in various ways to lead our R&D better.



Outcome 2 — measurement scene of physiological data (64ch EEG and autonomic indicators)

3. Future plans

We continue the ongoing engagement with users in every stage of our R&D, from basic research to trial and assessment of the products.

Our R&D project also plans to build partnerships with educational sectors to proceed to trial implementations of Jizai Hon-yaku-ki for educational use. (Tokyo U: S. Kumagaya, Showa U: M. Nakamura, Tohoku U: K.I. Tsutsui)