Comprehensive Support for a Person with Disabilities: Application of the Extended Evolutional Meta-Model (EEMM) and the Linkage Model

Shinji TANI*

Abstract: This study describes the multidimensional and dynamic nature and the difficulty of consilience among professionals involved in supporting people with disabilities, as well as the need for an integrated model. It explains how the integrated model recently proposed in the area of Contextual Behavioral Sciences, called the Extended Evolutional Meta-Model (EEMM) is suitable for supporting people with disabilities (Hayes et al. 2019). Mochizuki (2007) proposed the "linkage model," which could be used to help people with disabilities. This study proposes combining a linkage model with the EEMM. Finally, two cases are introduced using the EEMM and linkage models. Further studies using these models are desirable. The EEMM can represent phenomena in which factors of multiple dimensions are interrelated, but the development of measurement methods and research designs that empirically demonstrate these relationships has only just begun. Future research is needed to develop the measurement and research design to demonstrate empirical evidence of the usefulness of the EEMM and linkage models.

Keywords: *EEMM, linkage model, comprehensive support, disabilities*

1. Issues in Supporting People with Disabilities

(1) Goals of Supporting People with Disabilities

A significant goal of supporting people with disabilities is to improve their quality of life (QOL) and protect their human rights together with the rights of their families. In the past, support and education were provided for various reasons, such as the idea that without support and education, people with disabilities would be a danger or burden to society or because people felt sorry for them. Subsequently, the Universal Declaration of Human Rights was adopted in 1948, and the Declaration of Human Rights of Persons with Disabilities was adopted in 2006. Finally, the goal of recognizing and guaranteeing the right to a fair and equitable life for all people with or without disabilities without imposing any conditions was declared. To achieve this goal, various attempts have been made to protect the human rights of people with disabilities and guarantee them a high QOL.

1) Issues in the collaboration of different professionals

Many different professions (such as teachers, social workers, doctors, nurses, and physical therapists) are involved in this activity. They collaborate to advocate for the human rights of

* Professor, College of Comprehensive Psychology, Ritsumeikan University

Email: stt23197@pl.ritsumei.ac.jp

Received on May 24, 2024, accepted after peer review on November 19, 2024; published online April 14, 2025.

Asia-Japan Research Academic Bulletin, 2025

ONLINE ISSN 2435-306X, Vol.6, 31

people with disabilities and improve their QOL. Often, people in different professions have unique perspectives. For example, each doctor may have a different way of thinking. We are attempting to bring together professionals from different perspectives to work collaboratively. However, conflicts of opinion, confrontations, and a tendency to neither deny nor affirm one another's ideas often occur in such cooperative activities. Thus, there can be a passive disregard for one another's opinions and it is difficult for individuals with different ideas and perspectives to work collaboratively. Is it possible for people with different ideas to collaborate to achieve a high quality of life for individuals with disabilities? What is required to accomplish this? This study primarily addresses this question. When people from different professions collaborate, we require a model similar to a musical score for an orchestra. This model allows us to act in a manner that enhances QOL while maintaining different perspectives.

2) ICF model

The International Classification of Functioning (ICF) was proposed as a model that can be used collaboratively by professionals with different perspectives.[1] The ICF model has promoted a rethinking of the concept of disability from the perspective of society rather than from the medical perspective, which has traditionally viewed disability as an individual problem. It views disability as a limitation in participation and activity. By viewing disability in this manner, we can view the problem of disability as a way of reviewing problems created by society. The ICF model identifies the limitations of participation and activity that occur for a particular individual and creates a checklist that can be used by professionals in different professions to develop solutions.

However, several problems have been identified with the ICF model. Social scientists have criticized it as merely an eclectic mix of medical and social models (Mogi 2002). They indicated that this has weakened the attitude of a changing society. Shakespeare (2013) insisted that more elaborate and complex approaches are required to promote practices that cover all the complicated issues including health, psychological, and political issues of people with disabilities. The ICF model can identify the issues (there are many items); however, it is insufficient for creating solutions.

Therefore, a model that synthesizes different incompatible models is required. The model should be multidimensional because disability and QOL comprise factors that are dynamically interrelated at different levels. A person with a given disability who has problems at the physiological level is also affected by multiple factors at the social and cultural levels, and multifaceted problems at the individual level (e.g., cognitive, emotional, and motivational). They dynamically influence each other, limiting participation and activities. Therefore, a multidimensional and dynamic model that captures the problems of people with disabilities is required.

3) Mochizuki's linkage model

The most important question is how to help people with disabilities. We need a model to generate ideas and a method to help. This is similar to a musical score for supporting people with disabilities. Mochizuki (2007) presented a "linkage model in human services." This model is based on behavioral analysis, which considers QOL from a behavioral perspective and proposes the concept of behavioral QOL (Mochizuki 2001). Behavioral QOL is defined as the expansion and maintenance of behaviors maintained by positive reinforcement. We will consider ways to establish an environment in which a person's behavior is reinforced by positive reinforcement at the present moment, regardless of the disability. The person providing support requests that those around

1 The details of the development of ICF are on the website: https://www.who.int/standards/classifications/international-classification-of-functioning-disability-and-health

the person with a disability change the environment so that the person can receive reinforcement without changing their current behavior. This supporting person's action is called "advocate." For example, for a child who has not yet learned communication skills, the people around will guess the child's needs and, in a sense, anticipate and provide for them. Such an environment is in place to some extent; a support person asks the child to use tools in a way that can be accomplished with minimal behavioral change and reinforces them. Examples include pushing a button or touching a picture card. This action of the support person, suggesting the use of an alternative tool, is called "assist." As the opportunity for receiving positive reinforcement increases with alternative tools, the tool can be fazed out, and the support person shifts to teaching the new behavior. This act of helping to teach is called "instructing."

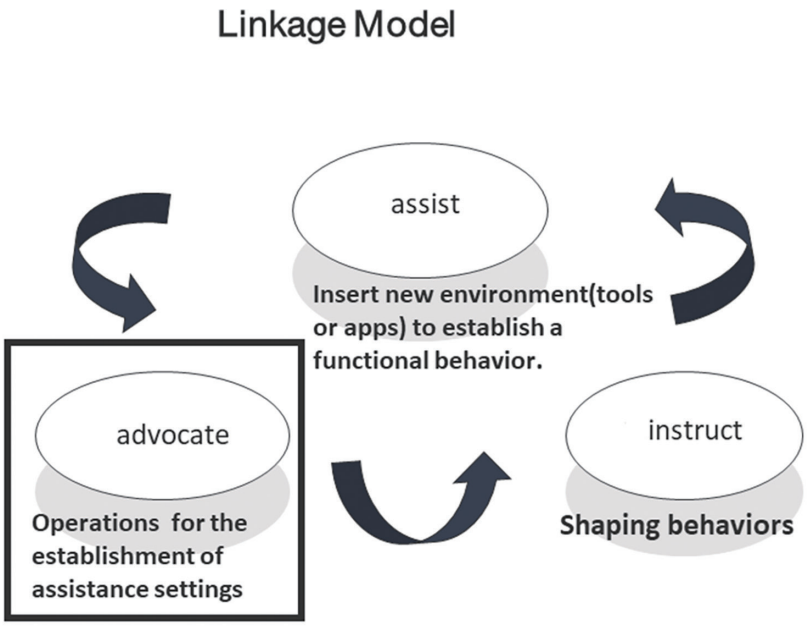

Figure 1. Linkage model
Source: (Mochizuki 2007, 7)

In this model, the behavior of the support person is modeled as "advocate," "assist," and "instruct." This model generates ideas for human services. Critically, the linkage model increases the opportunities for a person with disabilities to receive positive reinforcement (i.e., to expand their QOL), while the helping behavior of the support person gradually and seamlessly transitions from advocating to instructing. An illustration of the linkage model follows. Mr. A needs to "do shopping." The first aspect that emerges is to practice shopping. This support is referred to as an instruction in the linkage model. During instruction-based support, Mr. A does not receive reinforcement until the behavior is mastered. It takes a long time to receive reinforcement. Next, how can one conduct shopping, that is, receive reinforcement without having the skills to shop? For example, using a prepaid card, Google Translate, or using a picture card may come to mind. These supports are "assist" supports because the idea is to use alternative aid materials. Mochizuki's linkage model is a conceptual model that generates ideas for support in multiple dimensions.

In summary, the challenges faced by people with disabilities are multidimensional and involve multiple levels. Therefore, the support persons are required from different fields each offering unique perspectives. The ICF has been used as a model; however, it has various problems. The ICF

can clarify what to support but cannot specify how to support it. Therefore, Mochizuki's linkage model could be used to create concrete ideas.

2. Model for Collaboration

We will consider the issue of collaboration of support persons with different ideas. In recent years, clinical psychology, particularly behavioral science, has used ideas from life sciences and evolutionary theory to enhance the consilience of different scientists and create overarching models. The next section briefly discusses the relevance of overarching models to life sciences and evolutionary theory.

(1) Ideas from Life Science and Evolutionary Theory

Darwin's theory of evolution explains evolution as deriving from natural selection (Darwin 1859). Natural selection implies that variation produces an organism with characteristics that provide it with a slight survival advantage over other individuals. This organism is better adapted to its environment than other organisms, and these characteristics are passed on to the next generation. Darwin's theory of evolution states that variation, selection, and retention (heredity) are interrelated factors that produce new traits from one generation to another.

Darwin's theory of evolution has been combined with the study of genes, or life sciences, to elucidate the evolutionary process in more detail; today, it has become a new theory called modern evolutionary synthesis (Laland et al. 2015; Pigliucci and Müller 2010). What is new in modern evolutionary synthesis is that purposeful and intentional evolution can be created in the human species. Humans are able to create appropriate environments. For example, the environment can be changed from hot to cold using air conditioning. Weapons are created to defend ourselves against foreign enemies. The Internet platform was developed to convey information.

According to Darwin's theory, evolution is the product of chance, and the direction of evolution is by chance; however, the human ability to create and alter environments has changed the direction of evolution from chance to intention. Moreover, it is believed that the ability to create this environment has been enhanced by the symbolic ability, language, or culture that humans, unlike other animals, possess exclusively (Monestès 2015). What type of cultures and environments have humans created? Let us examine this in the context of the history of support for people with disabilities.

As previously mentioned, in the past, people with disabilities were supported and educated owing to altruism (philanthropy). During the second half of the twentieth century, the world attempted to create an environment in which people with disabilities could live without any inconvenience; and we have achieved concrete changes in the environment. When I was in high school, approximately fifty years ago, there was no wheelchair-accessible train station in Japan. Streets had steps, stations did not have elevators, and buses were not equipped for wheelchair access. Today, almost every station has elevators to assist people using trains and buses. These changes in the environment were unimaginable fifty years ago. We created a new culture that changed the environment. As we continue to do so, changes in behavior may be passed on to the next generation.

What type of a world do we want? If we can create an environment of equity, justice, and respect for diversity, human behavior may change toward empathy, security, and love. As that change in behavior is passed on to the next generation and the next and the next world, new genetic traits may be created. These possibilities present promising directions for future research and practice.

(2) EEMM

Behavioral science adopts this evolutionary idea and proposes a meta-model that integrates support based on different perspectives. The meta-model refers to a comprehensive framework that integrates multiple models. It is a model that distinguishes between ideas and simultaneously brings them together within a common framework. This model is called the Extended Evolutionarily Meta-Model (EEMM) (Hayes et al. 2019). An advantage of the EEMM is that it organizes the factors that produce changes in a matrix of levels and factors. There are three levels (biophysiological, sociocultural, and individual) in a certain context, in the form of variation, selection, retention, and context (Hayes, Monestès and Wilson 2018). The EEMM model reorganizes previous findings from a new perspective. It synthesizes the findings of previous studies for collaborative use by people with different perspectives. Thus, it integrates different ideas while keeping them unchanged.

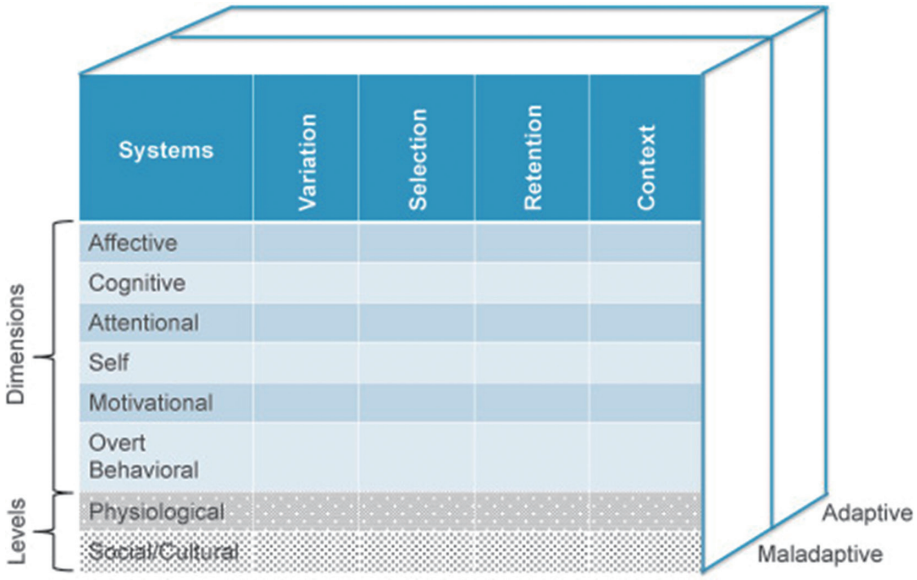

Figure 2. EEMM (Hayes et al. 2019)
Source: Licensed by Elsevier (Number:5885130974268, Oct 09,2024)

The EEMM uses four systems (variation, selection, retention, and context), six dimensions (cognition, emotion, motivation, attention, self, and overt behavior), and two levels (physiological and sociocultural) to describe the process of change in psychological interventions. As the process of change can be adaptive or maladaptive, it is represented in the EEMM in two layers (maladaptive and adaptive). The four systems have an effect on not only a single dimension but also multiple dimensions. Many studies have revealed that rigidity at the emotional, cognitive, attentional, and behavioral levels is related to psychopathology and that the magnitude of variability is key to producing appropriate changes in a given situation. Selection focuses on the type of behavior that an individual selects and has an impact on multiple dimensions (affective, cognitive, self, etc.). They may make choices that are effective in the short term but increase suffering in the long term, or they may make choices that are painful in the short term but improve their QOL in the long term. Therefore, helping individuals select behaviors related to their personal values (cognitive dimension), such as creating close relationships or participating in society, is important for helping people with disabilities. Retention reinforces maintaining a selected behavior in a person's environment. Activities that promote retention (e.g., self-monitoring and self-reflection) are important, because any behavior will disappear if it is not maintained. Evolutionary analysis emphasizes sensitivity to

context. When the sensitivity to context is poor, variation is less likely to occur, and appropriate choices are less likely to be made in accordance with changes in the environment. Therefore, sensitivity to context is considered to have a significant influence on variation, selection, and retention.

The various activities performed to support people with disabilities span multiple grids, as indicated by the EEMM. For example, mindfulness activities will engage the variability of an individual's attention dimension and impact selection, and programs that teach social skills will increase the variability of healthy behaviors and impact the selection of the dimension of cognition.

The EEMM was created based on the results of an extensive meta-analysis called the "Deathstar Project" by Hayes et al. (Hayes, Hofmann and Ciarrochi 2020). Such research is required to help people with disabilities in the future. To develop an EEMM for people with disabilities, a meta-analysis of the empirical evidence from previous studies is required.

3. Support for People with Disabilities using the EEMM and the Linkage Model

This section discusses a hypothesis using the EEMM to address the challenges faced by people with disabilities. To support people with disabilities, positive and inclusive support with respect to the values of people should be planned. This is called positive behavioral support (PBS; Crone, Hawken and Horner 2015). Challenges for a person with a disability may include challenges at the biophysiological level. For example, a child with cerebral palsy may have central nervous system deficits that cause motor function problems. Occasionally, cognitive and sensory problems can arise. Moreover, the sociocultural challenges are associated with limited participation. Consider these, in the EEMM, as problems of variation, selection, and retention in a given context.

Considering the individual level, medical rehabilitation will increase variations (behavioral variations) in the levels of movement, attention, and sometimes cognition. Educational and psychological interventions will also increase the variation in levels of attention, motivation, and cognition and expand the range of selection. The use of pictorial cards, wheelchairs, and assistive devices can provide a wide range of options. Social movements to create wheelchair-accessible communities and transportation, main streaming, equity, and society for all will expand and retain choices for children with cerebral palsy. Movements that create an equitable society will lead to the expansion of selection and retention across generations.

The EEMM and the linkage model may be useful when considering where and how to support the challenges faced by a particular person with a particular disability. I believe it would be possible to organize the support provided in the EEMM. What levels and dimensions should one work in? What type of support is required? Is it "advocate support," "assist support," or "instruct support"?

(1) Case Examples

1) Case 1

The first case involved a 9-year-old boy with severe intellectual disability and autistic behavior. He was able to perform simple imitations but had limited spoken language skills. His language comprehension was also limited. His mother trained him to communicate his needs by using picture cards. However, he would only select his favorite toys and food picture cards, therefore, his mother stopped presenting them. When the favorite toy and food cards were no longer presented, he made a random selection from the remaining picture cards, and the goal of

communicating the request was not achieved. His mother was concerned about the lack of time she spent with his older sister and the lack of progress in-home training.

At the individual level, applying the EEMM to the above case revealed many challenges in the cognitive and motivational dimensions. His cognitive behavior was limited, and he had difficulty communicating his needs to others (maladaptive variation and limited selection in the cognitive dimension). Moreover, aspects motivating his behavior were limited, such as food or specific toys (maladaptive variation and limited selection at the motivational level). Therefore, we needed to expand his behavior with various positive reinforcements and allow him to select different behaviors in different situations.

It is necessary to expand the variation in cognitive levels and adaptive behaviors that successfully communicate demands to others and create an environment in which these can be maintained. Therefore, we introduced a "Change Card" that requires the mother to change the presented choices if it does not offer what he requires. This card conveys the meaning (function) "This is not what I want, therefore, provide other options" (this is considered an "assistant approach").

First, a short training session was conducted to explain the function of the cards. We presented a list of cards that did not contain what he required. We prompted him to select a "Change Card," thereafter, we changed the list to offer new options which included what he required. He promptly learned the function of the Change Card, after which, we requested that the mothers and teachers use the card in daily situations (advocate approach). The Change Card is currently being used appropriately. It led to an increased selection of items that he had not previously selected. He selected new items. Additionally, we instructed him to apply the cards in different situations (instruct approach). When a listener provides an incorrect item that he does not want, he uses the change card to request a change in the item. For example, if he requires his preferred item card, such as chocolate, but the listener provides him with a toy, he selects the change card. This is similar to a conversation, "You made a mistake, I do not want this. Please change." He could easily apply the Change Card to a new context. Within the EEMM, the request behavior has limited variations, and motivation is also limited. The instruct and advocate approaches were useful in increasing the variation in requesting behavior and motivation.

2) Case 2[2]

The patient was a 16-year-old girl with an autism spectrum disorder (ASD). She often concentrated or overfocused on aspects she worried about or liked, did not have stable interpersonal relationships with classmates, did not feel confident about creating positive interpersonal relationships, and often felt isolated and frustrated. The ACT Matrix (Polk et al. 2016) was used to help her perform the actions required to achieve a meaningful life. As she faced obstacles while "moving toward" her important goals, she mentioned having ASD, not being able to make sense of what people say, being focused on what she likes, not paying attention to other aspects, and being absorbed in what she could not understand. To distract herself from them, she often played games, took breaks, kept to herself, and listened to music.

While examining the short- and long-term effects of these coping behaviors, she noticed loops that kept her going. She named the loops the "100 percent understanding loop" or "high-resolution loop." A high-resolution loop is one in which she is so focused on what is bothering her that she misses everything else. When she was having a conversation with classmates and could not understand words or something which they said, she often asked her classmates, "What does that mean?" Her classmates would become annoyed and move away. She explained, "Normal people can

2 The details of the procedure and results were shown in Tani (2023).

understand what others told them...I am not normal; I have ASD; therefore, I cannot understand." She believes that she must understand exactly and 100 percent of what the other person says; she followed this idea, and consequently, she avoided her classmates.

Organizing her situation in terms of the EEMM, at the individual level, there was limited cognitive variation; that is, SHOULD BE 100% LOOP or HIGH-RESOLUTION LOOP. These cognitions are believed to have been repeatedly selected. In addition, the perception of having ASD is believed to cause a decrease in the motivation to change. Hypersensitivity to visual and auditory stimuli was also observed. With regard to the emotional dimension, she continued to feel isolated and frustrated. On a social level, the lack of understanding at school allowed her maladaptive state to persist (retention). In addition, her mother believed that since she had difficulty with interpersonal relationships because of her ASD and that it was inevitable that she was hypersensitive to stimuli, it was necessary to keep her away from those stimuli and advise her. This was considered to play a role in suppressing variation in motivation. The underlying cause may be hypersensitivity to stimuli as a neurodevelopmental disorder at the physiological level.

To support her, we applied the ACT Matrix to increase her cognitive flexibility and motivation for value-based behavior. Simultaneously, we asked her mother to participate in the ACT Matrix psychoeducation to increase her cognitive variation (advocate approach).

Eight sessions and a follow-up booster session were conducted. At the end of the eight sessions, psychological measurements revealed that her QOL and psychological flexibility had improved and were maintained at the three-month follow-up. Various behavioral changes were also reported, such as chatting with friends, wearing clothes she had never worn before, and eating food she had never eaten before, as well as many changes in the motivation dimension. She is now able to challenge herself when she has difficult emotions. She is now able to mindfully respond to stimuli to which she was hypersensitive earlier, and she feels alive and full of life. I believe that these results were achieved by learning the ACT Matrix from her mother.

4. Conclusion and Future Directions

This study summarizes the usefulness of the EEMM (Hayes et al. 2019) and the linkage model (Mochizuki 2007) to support people with disabilities. Supporting people with disabilities is a multifaceted process that involves individual, social, political, cultural, and biological factors. The EEMM can be useful as a meta-model for practitioners from different disciplines to collaborate to support people with disabilities, and the linkage model can generate concrete support ideas. Although two case studies were presented using the EEMM and the linkage model, further empirical evidence is needed to fully validate the ideas described. The EEMM framework is expected to be used by a variety of professionals working together to help a particular client improve his or her quality of life and well-being. However, most studies using the EEMM have focused on the effectiveness of the psychological intervention, not on the usefulness of collaboration among different professionals (Hofmann, Hayes and Lorscheid 2021). Future research should be conducted using this model to organize several practical studies. Thus, measurement methods and research designs need to be developed to empirically demonstrate the usefulness of the EEMM and linkage models. Future research should focus on developing designs to identify multilevel processes that enhance the quality of life and welfare for people with disabilities and to create measurement methods that allow for the identification of processes that involve networked factors at multiple levels. For example, network analysis has recently been used in Process Based Therapy to analyze multilevel and complex processes.

References

Crone, D. A., L. S. Hawken and R. H. Horner. 2015. *Building Positive Behavior Support Systems in Schools: Functional Behavioral Assessment*. New York: Guilford Publications.

Darwin, C. 1859. *On the Origin of Species: A Facsimile of the First Edition*.

Hayes, S. C., J. L. Monestès and D. S. Wilson. 2018. Evolutionary Principles for Applied Psychology. In Steven C. Hayes and Stefan G. Hofmann (eds.), *Process-Based CBT: The Science and Core Clinical Competencies of Cognitive Behavioral Therapy*. Oakland: Context Press, 179–193.

Hayes, S. C., S. G. Hofmann, C. E. Stanton, J. K. Carpenter, B. T. Sanford, J. E. Curtiss and J. Ciarrochi. 2019. The Role of the Individual in the Coming Era of Process-Based Therapy. *Behaviour Research and Therapy*, 117, 40–53.

Hayes, S. C., S. G. Hofmann and J. Ciarrochi. 2020. Building a Process-based Diagnostic System: An Extended Evolutionary Approach. In S. C. Hayes and S. G. Hofmann (eds.), *Beyond the DSM: Toward a Process-based Alternative for Diagnosis and Mental Health Treatment*. Oakland: Context Press/New Harbinger Publications, 251–278.

Hofmann, S. G., S. C. Hayes and D. N. Lorscheid. 2021. *Learning Process-Based Therapy: A Skills Training Manual for Targeting the Core Processes of Psychological Change in Clinical Practice*. Oakland: New Harbinger Publications.

Laland, K. N., T. Uller, M. W. Feldman, K. Sterelny, G. B. Müller, A. Moczek, E. Jablonka and J. Odling-Smee. 2015. The Extended Evolutionary Synthesis: Its Structure, Assumptions and Predictions. *Proceedings of the Royal Society B: Biological Sciences*, 282(1813), 20151019.

Mochizuki, A. 2001. Kōdōteki QOL: "Kōdōteki Kenkō" heno Puro-Akuteibu na Enjo [Behavioral QOL: A Measure of Proactive Support for "Behavioral Health" in Persons with Severe Mental Disability]. *Kōdō Igaku Kenkyū [Japanese Journal of Behavioral Medicine]*, 7(1), 8–17. (In Japanese)

———. 2007. Taijin Enjyo no Sinrigaku toha (Psychology for Human Services). In *Taijin Enjyo no Sinrigaku [Psychology for Human Services]*. Toky: Asakura Shoten, 1–18. (In Japanese)

Mogi, T. 2002. Shōgai to Ningen Shutai: ICF no Shōgai Gainen tono Kanren de Kangaeru [International Classification of Functioning and Disability and People with Disabilities]. *Shōgaisha Mondai Kenkyū [Japanese Journal on the Issues of Persons with Disabilities]*, 30(3), 186–194. Retrieved from <https://cir.nii.ac.jp/crid/1522825129801482112> (accessed April 11, 2024).

Monestès, J. L. 2015. A Functional Place for Language in Evolution: The Contribution of Contextual Behavioral Science to the Study of Human Evolution. In R. D. Zettle, S. C. Hayes, D. Barnes-Holmes, and A. Biglan (eds.), *The Wiley Handbook of Contextual Behavioral Science*. Chichester: Wiley Blackwell, 100–114.

Pigliucci, M. and G. B. Müller. 2010. Elements of an Extended Evolutionary Synthesis. In Massimo Pigliucci, Gerd B. Müller (eds.), *Evolution: The Extended Synthesis*. Cambridge: The MIT Press, 3–17.

Polk, K. L., B. Schoendorff, M. Webster and F. O. Olaz. 2016. *The Essential Guide to the ACT Matrix: A Step-By-Step Approach to Using the ACT Matrix Model in Clinical Practice*. Oakland: New Harbinger Publications.

Shakespeare, T. 2013. *Disability Rights and Wrongs Revisited*. London: Routledge.

Tani, S. 2023. Relational Frame Theory-Oriented Acceptance and Commitment Therapy Matrix for Autism-Spectrum Disorder: A Clinical Case Report. *Ritsumeikan Journal of Human Sciences*, 47, 13–23.