

Research Articles // Artículos de investigación

- | | | |
|--|-------|--|
| Simone Gorinelli
Ana Gallego
Päivi Lappalainen
Raimo Lappalainen | 5-19 | Psychological Processes in the Social Interaction and Communication Anxiety of University Students: The Role of Self-Compassion and Psychological Flexibility. |
| Palmira Faraci
Giusy D Valenti | 21-32 | Dimensionality and Accuracy of Measurement Based on Item Response Theory in the Fatalism Scale During the COVID-19 Pandemic in Italy. |
| Isaías Vicente Lugo González
Fabiola González Betanzos
Silvia Susana Robles Montijo
Cynthia Zaira Vega Valero | 33-43 | Psychometric properties of the Beliefs about Medicines Questionnaire (BMQ) in Mexican adults with asthma. |
| Taiki Shima
Natsumi Tsuda
Kazuki Hashiguchi
Takashi Muto | 45-63 | Effect of Adjusting Cultural Backgrounds on the Impact of Metaphors: A Preliminary Study. |
| Laura Inés Ferreira
Luís Janeiro | 65-75 | Treating affect phobias: Therapeutic alliance as a moderator of the emotional experience effect on outcomes. |
| Patrick Okoh Iyeke
Luís Janeiro | 77-87 | Reducing Social Anxiety among Adolescents in the Covid-19 Era: Rational Emotive Behavior Therapy as a Counselling Approach. |

Notes and Editorial Information // Avisos e información editorial

- | | | |
|------------------|---------|---|
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| Editorial Office | 115 | Cobertura e indexación de IJP&PT. [<i>IJP&PT Abstracting and Indexing</i> .] |

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Effect of Adjusting Cultural Backgrounds on the Impact of Metaphors: A Preliminary Study

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ABSTRACT

This pilot study investigated the impact of cultural background adjustment on the effect of metaphors, which are used in acceptance and commitment therapy (ACT) as tools for behavioral change. For adequate function, scholars propose the effectivity of employing examples of metaphors in line with individual characteristics or cultural contexts. Therefore, this study conducts a preliminary investigation of the effect of metaphors adjusted to reflect cultural context on students from a different culture than the one in which the metaphor was created. The increase rates of the tolerance time of a cold-pressor task time were compared between three groups, namely, (a) adjusted (ACT metaphor adjusted to the Japanese culture; $n=12$); (b) translated (translated ACT metaphor in a textbook; $n=12$); and (c) control (without metaphor; $n=11$). Analysis revealed that the adjusted group displayed a significant increase rate compared with the other groups with large effect sizes. Additional analysis using a reliable change index revealed that although 8.33% of participants showed significant increment in the translated group, 33.33% in the adjusted group. Those who showed significant increment were participants with high mindfulness traits. Therefore, the result suggested that adjusting the cultural context is a factor that can increase the effect of metaphors and mindfulness may moderate the effect. *Key words:* metaphor, cultural difference, acceptance, cold-pressor task.

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Novelty and Significance

What is already known about the topic?

- Metaphors are frequently used in the clinical setting, especially in acceptance and commitment therapy, to alter a client's behavior.
- Although it was highlighted that optimization of the metaphor's content to the listener's context may play an important role in effectiveness, empirical data supporting this suggestion are lacking.

What this paper adds?

- Increase rates in pain tolerance time were significantly large by employing culturally adjusted metaphors compared with unadjusted or the nonuse of metaphors.
- Considering a listener's cultural background when selecting or creating metaphors may be useful in the clinical setting.

Many psychotherapeutic models, such as Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 2012), employ metaphors as a useful tool for behavioral change (Törneke, 2017; Villatte, Villatte, & Hayes, 2016). Metaphors are used in clinical situations because they validate experiences, promote awareness of situations or behavioral changes, deliteralize from psychological contents, and increase the psychological/behavioral flexibility of clients, among others (Foody, Barnes-Holmes, Barnes-Holmes, Törneke, Luciano, Stewart, & McEnteggart, 2014; Hayes *et alia*, 2012; Törneke, 2017). A representative metaphor used in the ACT is quicksand, which can

* *Correspondence:* Taiki Shima, Faculty of Psychology Doshisha University, Japan. E-mail: t.shima1205@gmail.com. *Acknowledgments:* Some of this study's results were presented at the ACT Japan Annual Meeting and the Annual Meeting of the Japanese Psychological Association. We would like to thank Yuma Okada for his support. This work was supported by JSPS KAKENHI (grant number 17J10709, 19K14461) and a grants-in-aid of the Fukuhara Fund for Applied Psychoeducation Research, Tokyo, Japan. The authors would like to thank Enago (www.enago.jp) for the English language review.

implicitly convey the unworkability of one's attempt to control private experiences. In this metaphor, for example, employing many coping behaviors in an effort to control anxiety is compared to struggling in quicksand. If this metaphor functions effectively, then clients may be likely to recognize the results of their behaviors or to change their behavior. Because the knowledge of the paradoxical result of struggling in quicksand is transfer into attempts to control their anxiety. In ACT, therapists aim to alter behavior through the appropriate use or creation of metaphors in a given context (Törneke, 2010; 2017).

From the perspective of Relational Frame Theory (RFT; Hayes, Barnes-Holmes, & Roche, 2001), which is the theoretical foundation of ACT, metaphors expected to be of effective use in clinical situations are analyzed as responses that relate two separate relational networks (Foody *et alia*, 2014; Stewart & Barnes-Holmes, 2001). For example, a causal relational network, such as struggling in quicksand–drowning in the quicksand metaphor, is coordinate with struggling with anxiety (panic). Thus, the function of struggle as having negative consequences be transferred to the recognition that struggling with anxiety may lead to panic (Foody *et alia*, 2014). Therefore, from the perspective of RFT, metaphor involves four elements, namely, (a) establishing two separate equivalence relations, (b) deriving a relation between these relations, (c) discriminating a formal relation via this relation-relation, and (d) a transformation of functions on the basis of the formal relation discriminated in the third element (Foody *et alia*, 2014; Stewart & Barnes-Holmes, 2001). Furthermore, from the perspective of recent developments in RFT, such as the hyperdimensional multilevel (HDML) framework (Barnes-Holmes, Barnes-Holmes, & McEnteggart, 2020), metaphor is defined as an arbitrarily applicable relational response at the level of relating relations (Barnes-Holmes, Barnes-Holmes, Luciano, & McEnteggart, 2017). Relating relations involves training and testing for at least two sets of separate combinatorially entailed relations (Barnes-Holmes *et alia*, 2020); thus, it is understood to correspond to the abovementioned analysis (Foody *et alia*, 2014; Stewart & Barnes-Holmes, 2001). In this manner, metaphor derives a new relation by relating two separate relations, such that the function of the original relational network had will be transformed. Based on this analysis, the workability or important aspects of using metaphors in the clinical setting are considered.

Using metaphors have many advantages for clinical practice. For example, the intentional use of metaphors helps clients easily memorize its contents (Martin, Cummings, & Hallberg, 1992), whereas collaborative use reinforces a therapeutic relationship with a client (Angus & Rennie, 1988). Furthermore, new relations derived via metaphors can offer rules to enact new workable behaviors (Villatte *et alia*, 2016). A related experiential analysis about rule-governed behaviors based on HDML demonstrated that the level of coherence manipulated through feedback for derived relation will impact the probability of rule-following when the rule is at a high level of derivation (Harte, Barnes-Holmes, Barnes-Holmes, & Kissi, 2020). In other words, a new rule derived via metaphors denotes a high level of derivation in the early stage, and the likelihood of the occurrence of new behaviors can be increased by enriching feedback to the derived relational responding at that stage. In this manner, metaphors may play a significant role in the clinical setting. Therefore, conducting a study to investigate the impact of these variables on its effect is necessary.

Three experimental studies were established to investigate variables regarding metaphors, which are considered to promote psychological flexibility (Criollo, Díaz Muella, Ruiz, & García Martín, 2018; Pendrous, Hulbert-Williams, Hochard, & Hulbert-

Williams, 2020; Sierra, Ruiz, Flórez, Riaño Hernández, & Luciano, 2016). Two of these studies identified common physical properties as a possible variable (Criollo *et alia*, 2018; Sierra *et alia*, 2016) by investigating whether tolerance time using a cold-pressor task increased when the swamp metaphor was used. The metaphor entailed participants to imagine crossing a cold and dirty swamp to obtain important things at the opposite side. At this point, the experience that their hands are dipped in cold water during the experimental task was relevant to the story of the metaphor. The results demonstrated that the swamp metaphor increased tolerance time. However, the importance of common physical properties became subject to debate. Moreover, a replication study conducted by Pendrous *et alia* (2020) did not support these results. Thus, further investigation is required.

Apart from common physical properties, conceptual analyses that examined variables promoting the function of metaphors were conducted. For example, scholars recommended that therapists should select/create metaphors that conform to the cultural background or characteristics of their clients (Masuda, 2016; Villatte *et alia*, 2016). Specifically, modifying the contents of metaphors to reflect the sociocultural context of clients or to employ the metaphorical language they use is important (Pasillas & Masuda, 2014; Villatte *et alia*, 2016). From the HDML perspective, metaphors should be selected or created with high levels of coherence with the relational networks of clients. Therefore, therapists should pay close attention to the use of metaphors in cultures (e.g., eastern, such as Japan) that differ from the one in which metaphors were created (e.g., western) because such metaphors may not be coherent with the current relational network of clients.

The foregoing point is connected with the discussions on the relationship between the target (an object whose function is altered by the metaphor) and the source (familiar areas of experience, Törneke, 2010) of a metaphor. In other words, in the functioning metaphor, an important aspect is that the source should have a more salient stimulus function or notable property than that of the target (Foody *et alia*, 2014; Stewart & Barnes-Holmes, 2001; Törneke, 2010; 2017). Thus, to achieve the intended function of metaphors, therapists should adjust the contents and modify their use of language, examples, and expressions of metaphors, such that the source is more salient and fit for the cultural context of the client (Pasillas & Masuda, 2014; Villatte *et alia*, 2016). The abovementioned suggestions may correspond to the selection of a metaphor's content or source with stronger orienting or evoking properties as proposed in ROEing (relating: various methods to relate stimuli and events; orienting: noting or attending to stimuli or event; and evoking: evaluating whether noted stimuli or events are appetitive, aversive, or relatively neutral), which is a conceptual analytic unit in recent RFT (Barnes-Holmes *et alia*, 2020). However, although scholars suggested adjustments that focus on cultural contexts to improve the effectiveness of ACT (Hayes, Muto, & Masuda, 2011), empirical data that suggest whether such adjustments enhance the effect of metaphor are lacking.

Therefore, this study preliminarily investigates whether adjusting the contents of metaphors in terms of cultural background improves its effectiveness. This study aims to manipulate the salience of the stimulus function of the source by adopting the metaphor's content to be more familiar with the Japanese experiences. The assumption is that the salience of the source will increase, and the effects of metaphors will be improved when using a metaphor consistent with the Japanese cultural context. Furthermore, this study intends to provide empirical data to support the point made by Pasillas and Masuda (2014) and Villatte *et alia* (2016), that is, a focus on metaphor content is required to achieve

its intended function when using metaphors. This objective is considered consistent with the proposal regarding the direction of contextual behavioral science research by the Association for Contextual Behavioral Science Task Force on the Strategies and Tactics of Contextual Behavioral Science Research (Hayes *et alia*, 2021; e.g., recommendation 16 or 29). Specifically, this study contributes to the literature on the generalization or modification of principles or interventions to various contexts.

METHOD

Participants

The study recruited 53 undergraduate students (30 females; *Age*: 20.67 years). They were randomly assigned to three groups, which will be described in the next section. However, this study focuses on cultural context, especially that of Japan. Thus, the participants should be native Japanese speakers and have lived in Japan longer than they did in other countries. Therefore, the results of foreign students ($n = 2$) were included in the analysis only when assigned to the control group, which did not implement a metaphor (one student from Asia was assigned to the control group, whereas the other was excluded for an incomplete task). Each participant was paid 3,000 yen (approx. \$27.33). All procedures performed were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Design and Variables

The independent variable was the content of metaphors in the three groups (adjusted group: a metaphor optimized to the Japanese culture; translated group: a translated metaphor written in a textbook; control group: no metaphor).

The main dependent variable was pain tolerance. This study used the increased rate of duration of pain tolerance at post-measurement in relation to pre-measurement (post/pre). Previous studies pointed out that pain tolerance time in a cold-pressor task significantly varies between individuals, whereas tolerance time at pre-measurement may be controlled by calculating the abovementioned improvement rate (Sierra *et alia*, 2016).

Following Hayes *et alia* (1999) and Takahashi, Muto, Tada, and Sugiyama (2002), the secondary dependent variables were self-reports of discomfort/pain and the perceptions of other sensations during the cold-pressor task. Evaluations were implemented using the visual analog scale (VAS), recorded at 10s, 70s, 130s, 190s, 250s, and 300s after the task started and after it ended. The mean scores of the records were calculated and used for analysis.

Experimental Task

This study employed the cold-pressor task. The participants were required to place their non-dominant hand in cold water (3.5°C) for as long as possible. However, they were instructed that they were free to remove their hand from the water at any time. Those who kept their hand in the cold water for more than 300s were stopped for ethical reasons. A video camera was used to record the performance, where three evaluators independently measured tolerance time and averaged for analysis.

Instruments and Measures

The following measures were used to investigate intergroup homogeneity:

- Acceptance and Action Questionnaire-II* (AAQ-II; Bond, Hayes, Baer, Carpenter, Guenole, Orcutt, Waltz, & Zettle, 2011; Japanese version by Shima, Yanagihara, Kawai, & Kumano, 2013). The AAQ-II is a seven-item, seven-point Likert-type scale that measures psychological flexibility. Previous research conducted by Shima *et alia* (2013) demonstrated that the Japanese version of the AAQ-II contained adequate psychometric properties with a one-factor structure. In the current study, Cronbach's alpha was .88 (95% CI [.82 to .93]).
- Cognitive Fusion Questionnaire* (CFQ; Gillanders *et alia*, 2014; Japanese version by Shima, Kawai, Yanagihara, & Kumano, 2016). The CFQ is a seven-item, seven-point Likert-type scale that measures cognitive fusion. Shima *et alia* (2016) provided evidence that the Japanese version of the CFQ has adequate psychometric properties with a one-factor structure. In this study, Cronbach's alpha was .91 (95% CI [.88 to .95]).
- Five Facet Mindfulness Questionnaire* (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Japanese version by Sugiura, Sato, Ito, & Murakami, 2012). The FFMQ is a 39-item, 5-point Likert-type scale that measures mindfulness. Sugiura *et alia* (2012) mentioned that the Japanese version of the FFMQ has adequate psychometric properties with a five-factor structure that is the same as the original version. In this study, Cronbach's alpha was .85 (95% CI [.80 to .91]).

We used the following measures to conduct manipulation checks for the metaphors aimed to confirm the appropriateness of the experimental operation and participants' comprehension of the core ideas of the metaphors. As these measures were designed to confirm manipulation checks for metaphors, the employed items in the control group differed from those of the other groups that included metaphor intervention. In addition, a manipulation check was conducted to compare the adjusted and translated groups:

- Comprehension test.* To confirm the comprehension of the participants regarding the contents, tests were implemented after the intervention. The percentage of correct responses is calculated and used for analysis.
- Subjective evaluation about intervention.* When the significant effect is detected in the main outcome, it is required to identify which element of the intervention contributed to the change. Therefore, to confirm the effect of the difference in intervention between the adjusted and translated groups, the participants were asked to complete the following items using VAS. 1) "the perspicuity of the exercises" (from 0= not at all to 100= very easy to understand) to confirm whether the adjustment of a metaphor's material enables perspicuity of the metaphor itself, 2) "similarity to one's experiences and contents of exercises" (from 0= not similar at all to 100= very similar) to confirm whether the similarity between the participant's experience and the contents of metaphors differed between each group, 3) "familiarity of the exercise contents with the Japanese people" (from 0= not familiar at all to 100= very familiar) to confirm the difference of familiarity of the metaphor's contents for Japanese people between the two groups, and 4) "usefulness of the exercises to daily life" (from 0= not useful at all to 100= very useful) to identify the existence of a difference in anticipated usefulness between each pair of metaphors. In the control group, similar items that changed the word "exercise" to "lecture" were used to control the experimental time and procedure.

Experimental protocols

The interventions were carried out individually. The contents for each group, with reference to Hayes *et alia* (1999) and Takahashi *et alia* (2002), were as follows.

- Adjusted Group.* ACT-related psychoeducation and intervention, which contained metaphors and exercises, were implemented. This group was informed that (a) intentionally removing negative

thoughts and feelings is impossible, and (b) thoughts and feelings do not cause behavior. Regarding element (a), the short- and long-term effects of experiential avoidance were described, and a thought-suppression task was conducted for one min (Part A). For element (b), the Joe the Bum metaphor (Hayes *et alia*, 2012, p. 279), which was partially modified to fit the Japanese cultural context, was implemented to facilitate participants' understanding of the concept (Part B). The metaphor describes a situation where a bum named Joe comes to a housewarming party. It aims to convey the problem of trying to make him leave the party (experiential avoidance) and that accepting him and working on whatever one should and wants to do (not being dominated by thoughts and feelings) is possible. The Japanese people rarely hold home parties; thus, imagining the metaphor's scenario is difficult. For this reason, the situation was changed to a welcome or a drinking party at a club or a part-time job, and the character was modified to a peer whom the participants disliked. The objective was to increase the ease of imagery (i.e., the salience of the source of the metaphor) by incorporating scenarios likely experienced by the Japanese. In addition, an exercise based on the metaphor, namely, the modified version of "Soldiers in the Parade" (i.e., *Leaves on a Stream and Watching the Mind Train*; Hayes *et alia*, 2012, p. 255) was conducted to enrich the image of acceptance. The participants were instructed to imagine a situation in which they have a bird's eye view of the welcoming party. Then, they were encouraged to imagine the emerging private events as their peers were moving around and to let them be. The participants performed this exercise for three min.

The materials of the metaphor in Part B were modified in the adjusted group. The script used in Part B was as follows (the remainder of the script is described in the Appendix).

Imagine you are at a welcome or drinking party at your club or part-time job. Can you imagine you are talking with participants? You can move freely between seats and interact with various participants. You are having fun chatting with your friends and eating delicious food. You are having a great time, but then a peer you do not like arrives. This peer is a horrible person who can be bossy, talk badly about others, and treat others unfairly. Although this peer does not always do so, it worsens when you confront them about their behavior. This peer is fickle, and occasionally, he misbehaves. However, you cannot help but feel bad when he appears. Can you imagine that peer? It makes you feel somewhat unpleasant. Now, how will you deal with the situation when he appears? Let's imagine two ways of interacting with him.

One way of coping with this situation is to attempt to ignore or silence him or evacuate to another area. Imagine this peer interrupts when you are enjoying chatting with friends. You could try to turn him away in various ways because he is troublesome. Alternatively, you might become frustrated and say "Stop!" or try to avoid him by running off to your senior. However, the peer is persistent and meddling with you repeatedly. In addition, he is condescending and starts talking badly about you to others. Even if you try to avoid him, you find yourself worrying about where he is and what he is doing; therefore, you cannot chat with your friends, nor taste the scrumptious spread on offer, nor enjoy the party. If you try to avoid him or fight, your peer will become increasingly repulsive, and you will waste your energy. It is similar to the "pink elephant" that we just experienced. Can you imagine a situation like this?

Now, the other option is to dare to do nothing. As this peer is fickle, he might or might not be annoying. Although he becomes more annoying when you try to avoid or fight him, he might wander off and go to other people if you let him go. Therefore, can you continue to chat with your friends when the peer interrupts you? This peer is fickle, and he disappears and returns. Can you actually maintain a psychological distance with him while being here, instead of trying to kick him out? Can you imagine being able to actually stay here, instead of interrupting a chat with a friend because of your bad feelings?

You may indeed feel unpleasant because of the annoying peer. However, if you fight or avoid him, you will waste a large amount of effort and will be unable to enjoy the moment or the food. You can still let your peer be free even if you do not like him. Imagine a situation where you allow the peer to be free, in order to save your energy, and do what is important to you, such as chatting with your friends. The peer might still misbehave, disappear, or return. You may feel unpleasant when he returns; however, you can also enjoy the party. It is like accepting the peer, can you imagine this?

Now, this may seem abrupt, but imagine that the peer is an experience of unpleasant feelings, sensations, and thoughts. Can you do the activities you need and want to do while maintaining a reasonable distance from those experiences? Do you see that you can perform the same reaction as you did with the peer I previously mentioned? The peer and those experiences are the same in that they are uncontrollable. Furthermore, they are similar in that they cannot physically limit

our behavior. Can you imagine a situation where you can accept these unpleasant experiences and behave freely despite them? Even if you have those thoughts, sensations, and feelings, you can still behave differently.

Translated Group. For this group, the intervention content was the same as that for the adjusted group except for element (b). The conducted metaphor and exercise were based on the translated version. In other words, the participants were instructed to visualize a home party, and the character's name was Joe.

The script used in the translated group (that differed from the adjusted group), was as follows. The script employed in this study was based on Hayes *et alia* (2012).

Imagine that you have purchased a new house and have invited all of your neighbors over to a housewarming party. Everyone in the whole neighborhood is invited. You even placed a sign at the supermarket. Therefore, all of the neighbors arrive, the party's going great, and along comes Joe, who lives behind the supermarket in the trash dumpster. He's stinky and smelly and you think, "God, why did he show up!" He is a terrible person because he swears and complains to others. Although he does not always do so, it worsens when you confront him about it. Can you imagine that person? Well, you did say on the sign "Everyone's Welcome." Can you see that it's possible for you to welcome him and really, fully do that without liking that he's there? Let's imagine two options of interacting with him.

One option is that although you said everyone was welcome, in reality, he's not welcome. But as soon as you do that, the party changes. Now you have to be at the front of the house, guarding the door so he can't return. Alternatively, if you say "OK, you're welcome" but you don't really mean it –you only mean that he's welcome as long as he stays in the kitchen and doesn't mingle with the other guests– then you're going to have to be constantly ensuring he follows these rules and your entire experience will be consumed with this. The more you monitor Joe, the worse he swears. Meanwhile, life continues, the party's going on, and you're off guarding Joe. It's just not life-enhancing. It's not much like a party. It's a lot of work and not fun whatsoever! It is a waste of effort and similar to the "pink elephant" that we just experienced. Can you imagine a situation like this?

However, choosing the second option, you can welcome him although you don't respect him. You can dare to do nothing. As Joe is fickle, he might or might not be annoying. Although he becomes more annoying when you attempt to monitor him, he might wander around aimlessly if you let him go. You don't have to like him. You don't have to like the way he smells, nor his lifestyle, nor his clothing. You might be embarrassed about the way he's dipping into the punch or the finger sandwiches. Your opinion of him and your evaluation of him are absolutely distinct from your willingness to have him as a guest in your home. You can do what is important for you, such as having fun chatting with others or having delicious meals, even when he walks around the party venue. Of course, you may have unpleasant experiences when Joe is within sight; however, you can use the effort required to monitor or turn him away toward something more important. Imagine that you continue to do what is important for you while leaving him free to do as he pleases. It is like accepting Joe. Can you imagine it?

Now, this might seem abrupt, but what if all the feelings, memories, and thoughts that you don't like and that appear were just undesirable people at your door? The question is: What position would you take with them? Are they welcome? Can you choose to welcome them in although you don't like the fact they have arrived? If not, what's the party going to be like? Joe and these experiences are the same in that they are uncontrollable. Furthermore, they are similar in that they cannot physically limit our behavior. Can you imagine a situation wherein you can accept these unpleasant experiences and behave freely despite them? Even if you have those thoughts, sensations, and feelings, you can still behave differently.

Control Group. The participants were given a lecture with reference to Takahashi *et alia* (2002). An explanation of the basics of the sensation mechanism, an experiment on the two-point threshold, and an introduction to cognitive behavioral therapy techniques for pain were conducted. Regarding cognitive behavioral techniques, no exercise or training was conducted. The script employed in this group is described in the Appendix.

As previously stated, only element (b) differed between the adjusted and translated groups, whereas the salience of the metaphor was manipulated based on cultural differences. In addition, exercises were provided following the metaphors to train the participants in the strategies that they will engage in at the second cold-pressor task. In other words, the exercises were employed to promote the participants' understanding of metaphors.

Procedure

The research ethics committee of the institution approved the procedure of the study. Informed written consent was obtained from all participants. This experiment was conducted individually by one experimenter, which follows a pre-designed plot. A tablet was employed to complete the questionnaires. The participants were instructed to call the experimenter after filling out the questionnaire. The entire session lasted approximately 45 min.

Figure 1 depicts the flow of the experiment. After confirming that the participants were in good physical condition, informed consent was obtained, and the questionnaires were given (Phase 1). The cold-pressor task was then explained and performed. The participants were asked to record their discomfort, pain, and other sensations perceived during and after the task using VAS (Phase 2). Subsequently, an intervention lasting approximately 15-25 min was implemented, after which they responded to items regarding the manipulation checks for the metaphors and undertook a comprehension test (Phase 3). They were then invited to perform the cold-pressor task again, and each measurement was recorded using the same procedure in pre-measurement (Phase 4).

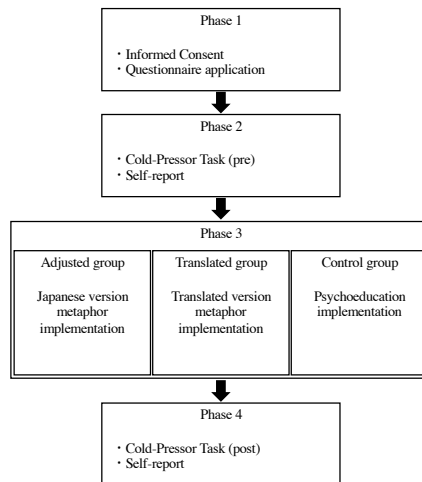


Figure 1. Overview of the Experimental Procedure.

Data Analysis

All analyses included data in which all two tolerance times of the cold-pressor task were less than 300s. Prior to analysis, the increase rate was logarithmically transformed by groups because ensuring normality was considered difficult due to the small sample size. Ten percent of the participants in each group (two participants with the highest and the lowest increase rates) were excluded based on the analytical procedure of Sierra *et alia* (2016). Data from the remaining participants were analyzed.

To confirm intergroup homogeneity, one-way analyses of variance (ANOVA) with the AAQ-II, CFQ, and FFMQ as the dependent variables were conducted. To conduct the manipulation checks for the metaphors, a *t*-test comparison was conducted between the adjusted and translated groups using the comprehension tests and subjective evaluation about interventions.

Furthermore, referring to Sierra *et alia* (2016), one-way ANOVA was conducted on the increase rate of tolerance time. The mean tolerance times and standard deviations for the pre and post tests were calculated to describe the actual change in tolerance time in each group. For secondary dependent variables, two-way ANOVAs were performed in the self-report measurement of discomfort, pain, and other sensations perceived during the task.

In addition, the reliable change index (RCI; Jacobson & Truax, 1991) was calculated for additional analysis. The RCI is used to assess whether a change in a particular indicator in an individual is statistically significant. It is expressed by the formula $RCI = (\text{posttest} - \text{pretest}) / \sqrt{2} (s\sqrt{1-r_{xx}})^2$. In this formula, s represents the standard deviation at the pretest, and r_{xx} represents the test-retest reliability. If the RCI value is greater than 1.96, the change in the individual is considered a greater change than the measurement error. Therefore, by calculating the RCI, it is possible to detect clinical changes. In this study, the reliability coefficient required to calculate RCI was obtained using a two-time measurement of the control group. Then, the participants that displayed significant increase rates in pain tolerance time in the adjusted and translated groups were identified. Using the RCI, it is possible to describe changes in individuals that would be discarded in an analysis of group difference. If common characteristics are extracted from individuals who show significant changes, this may result in the identification of the moderating or mediating variables that make the applied intervention work. This focus on individual change might also result in Process-Based Therapy (Hayes, Hofmann, Stanton, Carpenter, Sanford, Curtiss, & Ciarroch, 2019; Hofmann & Hayes, 2019). In this study, as a supplementary analysis, the scores of process measures (AAQ-II, CFQ, and FFMQ) were compared using t-tests between those whose RCI values were significant and not for each questionnaire to explore possible moderating variables. The investigation related to the RCI was conducted only using the data of the adjusted and translated groups because the reliability coefficient was calculated from the measurements of the control group.

RESULTS

The data from one participant who was unable to complete the task and 11 participants who could tolerate cold-pressor tasks greater than 300s were excluded. The remaining data from 41 participants were subjected to logistic transformation. Subsequently, referring to Sierra *et alia* (2016), two participants with the highest and lowest increase rates in each group, or a total of six participants, were excluded. Finally, 35 participants (23 females, $M_{age} = 20.74 \pm 0.92$ years; adjusted group: $n = 12$, translated group: $n = 12$, and control group: $n = 11$) were subjected to series of analyses.

One-way ANOVAs revealed no differences between the three groups in the AAQ-II ($F_{[2, 32]} = .00$, $p = .99$, $\eta^2 = 0.00$), CFQ ($F_{[2, 32]} = 0.37$, $p = .69$, $\eta^2 = 0.02$), and FFMQ ($F_{[2, 32]} = 0.32$, $p = .73$, $\eta^2 = 0.02$). Accordingly, these groups were deemed equivalent at pre-test with respect to these variables. Descriptive statistics of each questionnaire are indicated in Table 1.

Table 1. Descriptive Data and Condition Difference for Each Questionnaire

	Adjusted ($n = 12$)		Translated ($n = 12$)		Control ($n = 11$)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
AAQ-II	23.83	5.80	23.83	8.07	23.64	7.42
CFQ	22.92	7.68	26.08	10.26	25.36	10.1
FFMQ	117.33	11.09	117.25	12.05	121.91	20.7

Table 2 displays the *t*-test results for each measurement between the adjusted and translated groups and scores of the control group as supplementary information. Analysis revealed that the adjusted group scored significantly higher than the translated group only in the item “familiarity of the exercise contents with the Japanese people.” The other items’ scores are not different.

Table 2. Descriptive Data and Condition Differences between the Adjusted and Translated Groups for Each Index for Manipulation Checks.

	Adjusted (<i>n</i> = 12)	Translated (<i>n</i> = 12)	<i>t</i>	<i>df</i>	<i>p</i>	<i>d</i>	95% CI
Perspicuity of the exercises	74.83 (21.48)	67.50 (19.11)	0.88	22	.39	0.36	-0.45 to 1.17
Similarity to one’s experiences and contents of exercises	61.58 (38.26)	56.50 (19.51)	0.41	16.36	.69	0.17	-0.63 to 0.97
Familiarity of the exercise contents with the Japanese people	71.00 (24.58)	42.17 (19.87)	3.16	22	<.01	1.29	0.41 to 2.17
The usefulness of the exercises to daily life	83.58 (13.98)	70.08 (18.62)	2.01	22	.06	0.82	-0.01 to 1.65
Comprehension test	77.08 (16.71)	89.58 (11.72)	-2.12	22	.05	-0.87	-1.70 to -0.03
	Control (<i>n</i> = 11)						
Perspicuity of the lecture	86.82 (10.14)						
Similarity to one’s experiences and contents of lecture	64.27 (21.15)						
Familiarity of the lecture contents with the Japanese people	64.55 (23.33)						
The usefulness of the lecture to daily life	77.18 (12.28)						
Comprehension test	59.09 (11.31)						

Figure 2 illustrates the increase rate for each participant by groups. One-way ANOVA revealed that between-group difference was significant ($F_{[2, 32]} = 5.93, p < .01, \eta^2 = 0.27$). Moreover, the result of multiple comparisons indicated that although the adjusted group displayed significantly large increase rates than did the other groups (translated:

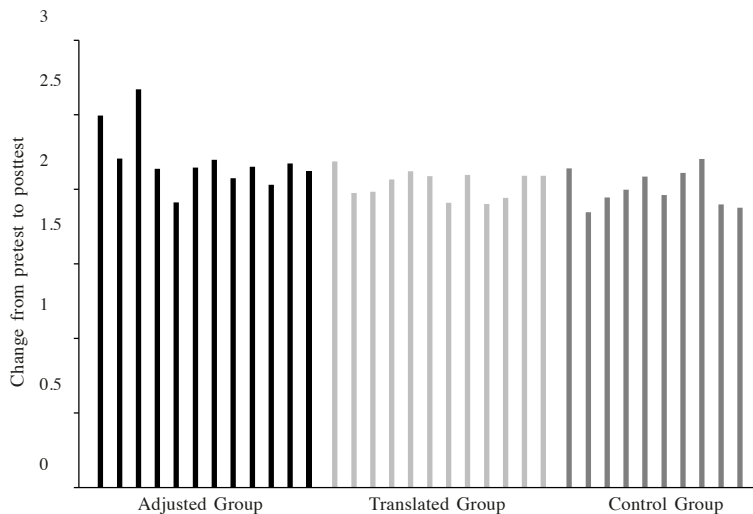


Figure 2. Differential Pain Tolerance for Each Experimental Condition (Each bar represents the logistic transformed change score from pretest to posttest of one participant).

$t[32]= 2.57, p= .02, d= 0.99$; control: $t[32]= 3.26, p <.01, d= 1.18$), no difference was detected between the translated and control groups ($t[32]= 0.75, p= .46, d= 0.42$). Furthermore, post-hoc power analysis revealed that $(1-\beta)= .72$. The mean scores and standard deviations for each group are indicated in Table 3.

Table 3. Descriptive Data and Condition Difference for Cold-Pressor Task Tolerance Time.

Group	Pre		Post	
	Mean	SD	Mean	SD
Adjusted ($n= 12$)	48.13	27.81	82.16	59.66
Translated ($n= 12$)	38.73	27.53	43.96	36.05
Control ($n= 11$)	39.12	19.06	39.58	22.84

Two-way ANOVAs performed on the secondary outcomes also revealed that although the main effect of time in the other sensations was significant, there were no significant interactions for all indicators (Table 4). Therefore, there were no group differences in the self-report measurements.

The test-retest reliability, which was calculated using a two-time measurement of the control group indicated ICC ($A, 1$)= .87 (.58 to .96). The calculation of RCI for each participant of both groups revealed that four out of 12 participants in the adjusted group (33.33%) showed a significant change (RCI >1.96) compared with one out of 12 participants in the translated group (8.33%).

As supplementary analyses, t -tests between participants who showed significant RCI value ($n= 5$) and not significant ($n= 19$) for each questionnaire were conducted. The significant difference was indicated only in FFMQ (RCI >1.96= 128.00±9.92, RCI <1.96= 114.79±10.18, $t[22]= 2.59, p= .02$; AAQ-II: RCI >1.96= 21.80±8.17, RCI <1.96= 24.37±6.64, $t[22]= -0.74, p= .47$; CFQ: RCI >1.96= 20.40±5.90, RCI <1.96= 25.58±9.49, $t[22]= -1.15, p= .26$). Those who showed significant changes in the adjusted group were in the first, third, fourth, and seventh place out of 12 participants. Within the translated group, participants showing significant change had the highest score. All of these participants showed greater scores than the standardized mean scores (113.19) reported in Sugiura *et alia* (2012).

DISCUSSION

This study aimed to investigate the effects of metaphors with a consideration of the cultural context. We used a metaphor for promoting acceptance and compared the increase rates of tolerance time in the cold-pressor task among three groups, namely, the adjusted group, which used a metaphor tailored to the Japanese cultural context; the translated group, which used a translated metaphor created in a cultural background other than Japan; and the control group.

The results demonstrated that the metaphor used in the adjusted group addressed contents that are generally familiar to the Japanese experience compared with the translated metaphor because the score for the item “familiarity of the exercise contents with the Japanese people” was higher than that of the translated group. This metaphor was intended to increase the salience of the source of the metaphor by incorporating a scenario that the Japanese are likely to experience, which functioned as intended. Furthermore, no differences were found between both groups except for the index;

Table 4. Descriptive Data and Group Difference for Each Self-Report Measure.

		Unpleasantness	Pain	Other sensations
Pre	A	65.50 (26.47)	78.25 (17.46)	38.17 (27.02)
	T	66.08 (15.67)	72.75 (14.86)	27.75 (18.12)
	C	71.36 (15.94)	78.73 (17.27)	19.64 (21.05)
Post	A	57.25 (20.91)	72.58 (12.74)	46.67 (20.64)
	T	62.92 (15.26)	70.67 (9.94)	34.00 (18.33)
	C	65.73 (16.14)	75.27 (14.07)	27.82 (13.41)
Group	<i>F</i> (2, 32)	0.51	0.49	3.01
	<i>p</i>	.61	.62	.06
Time	<i>F</i> (1, 32)	4.19	3.25	7.49
	<i>p</i>	.05	.08	.01
Interaction	<i>F</i> (2, 32)	0.29	0.26	0.06
	<i>p</i>	.75	.77	.94

Notes: A: Adjusted Group; C: Control Group; T: Translated Group.

thus, the quality of the other metaphor, which was used for the adjusted group, can be considered equal to that in the translated group.

Interpreting this study based on the HDML perspective (Barnes-Holmes *et alia*, 2020), the manipulation of the content might reinforce the orienting or evoking functions of the metaphor by setting the source that has a high level of coherence with the currently existing relational network of participants. However, this study overlooked the measurement of each dimension or function of the relational network. Therefore, experiments that can capture the change in each property of relational networks or its impact are required. For example, if a change in coherence level could be captured, then describing the relationship between employing sources with high levels of coherence with currently existing relational networks and recalling the metaphor are probable. By doing so, the results could lead to a workable procedure for creating tailored metaphors from the perspective of the HDML framework.

In terms of the increase rates of pain tolerance time in the cold-pressor task, the adjusted group exhibited significantly large change rates compared with those of the other groups with large effect sizes between the adjusted and other groups. Furthermore, the results of the additional analysis using RCI indicated that 8.33% and 33.33% of the participants showed a significant increase in pain tolerance time in the translated group and the adjusted group, respectively. Considering the preliminary nature of this study, that is a small sample size, we infer that the results warrant further investigation regarding the consideration of the cultural context in the use of metaphors.

No significant interactions were found in the secondary dependent variables such as self-report of discomfort, pain, or other sensations perceived during the task for each group. These results were consistent with those of previous studies (e.g., Criollo *et alia*, 2018; Hayes *et alia*, 1999; Sierra *et alia*, 2016; Takahashi *et alia*, 2002). To the best of our knowledge, the results of the current study may be one of the important findings given the application of ACT to culturally diverse targets.

However, although a significant difference was noted in the increase rate for pain tolerance time between the groups, a significant change in RCI was observed only in 1/3 of the participants in the adjusted group, which, thus, requires further investigation. These results suggest that only a few participants yielded strong reactions to the adjustment of the metaphor employed in this study (see Figure 2). In other words, although the metaphor

employed in the adjusted group may produce strong changes in reaction compared with those of the translated version, the extent to which the effect may have been influenced is limited. Based on the supplementary analyses regarding RCI, it is suggested that if a client shows a high FFMQ score or high mindfulness trait, it might be more likely to produce clinical change by introducing metaphors adjusted to their cultural context. However, this result was derived from a supplementary analysis and only indicates a possible candidate for a moderating variable for the effect of metaphors. Therefore, a more detailed study with a larger number of participants is required. The other possible reason for these results is that although the content of the metaphor may be applicable to many participants, it might lack optimization for an individual's experience. Out of the questions for manipulation checks for the metaphors, the adjusted group displayed a high score for the item "familiarity of the exercise contents with the Japanese people" compared with those of the translated group, as previously mentioned. However, no difference was observed in the item for "similarity to one's experiences and contents of exercises." For participants who had difficulty imagining the content of the metaphor because they had a little experience similar to the content used in the metaphor, it was difficult to say that the salience of the source in the metaphor was high. From the HDML perspective, for those participants, the source of the metaphor may not have a high level of coherence with the existing networks, which is insufficient for changing the orienting or evoking functions. The scores on the manipulation checks items also showed room for improvement in the metaphor or exercise (Table 2), that is, a broad range of cultural factors should be employed to render the metaphor more effective for a wide range of listeners. In clinical settings, therapists are required to adjust or create metaphors to optimize their use for the individual. However, in a group format or self-help setting, doing so under diverse situations is difficult. Therefore, studies that investigate and intend to develop effective interventions by adjusting the cultural context of the contents of the intervention, similar to the design of this study, are considered to contribute to and necessary for the development of standardized programs.

The results of this pilot study suggest that considering the client's cultural context when using metaphors may be effective. However, this study is positioned as preliminary because of its nature. In line with the important role of a preliminary study in suggesting future directions, we discuss related limitations and directions. First, the number of participants was small and limited to healthy undergraduate students. Therefore, experiments with a sufficient number of participants with other attributes are required to investigate the generalizability of the results across populations. Second, further investigation using various tasks is necessary because the study examined the effect of cultural consideration using one experimental task (i.e., cold-pressor). To further expand the generalizability of the current results, further studies should employ alternative tasks that are similar to the cold-pressor task (e.g., paced auditory serial addition task; Lejuez, Kahler, & Brown, 2003) or the other tasks, such as problem solving or reaction time tasks. Similarly, experiments using other forms of metaphor may be valuable. Third, further studies that examine the relationship between various types of variables that may impact the effect of metaphors and behavioral change are required. In this study, no common physical property (e.g., Criollo *et alia*, 2018; Ruiz & Luciano, 2015; Sierra *et alia*, 2016) was noted between the task and employed metaphor. As previously mentioned, although the replication study conducted by Pendrous *et alia* (2020) failed to support the previous findings and required further research, common physical property may be a promising variable that impacts the effect of metaphors.

Thus, future scholars should determine the moderation effect of cultural contexts with the incorporation of this factor. For instance, as supplementary analysis suggested that mindfulness could be a possible moderating variable, it also requires further investigation. Fourth, investigation under different experimental settings is required because the current setting was insufficient as an analog for the clinical setting. For example, the link between a client's values and related behavior was incorporated into the metaphor in the clinical setting but not in the current study. Thus, devising a setting that better resembles the clinical environment may be necessary. Lastly, studies that use psychological measures apart from the AAQ-II as an index of psychological flexibility are needed because the questionnaire faced several critiques or issues (e.g., Gámez, Chmielewski, Kotov, Ruggero, & Watson, 2011; Ong, Pierce, Woods, Twohig, & Levin, 2019; Rochefort, Baldwin, & Chmielewski, 2018; Tyndall, Waldeck, Pancani, Whelan, Roche, & Dawson, 2019; Wolgast, 2014). Therefore, a re-examination that uses other measurement tools, such as the multidimensional experiential avoidance questionnaire (Gámez *et alia*, 2011) when focusing on experiential avoidance and the comprehensive assessment of ACT processes (Francis, Dawson, & Golijani-Moghaddam, 2016) or the multidimensional psychological flexibility inventory (Rolffs, Rogge, & Wilson, 2018) when focusing on general psychological flexibility, is recommended.

Despite the abovementioned issues, this preliminary study suggests that considering the cultural background of listeners may be useful when selecting or creating metaphors. We hope that future research will lead to the elaboration of the use of metaphors to explain cultural differences.

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APPENDIX

Part A

How do you usually cope with when you experience pain? Generally speaking, when we become aware of unpleasant feelings, thoughts, or other experiences, we attempt to eliminate them. This is very natural for us, and therefore, it might be automatic. These coping strategies are common for us, and you may use them on a regular basis. However, recent research indicates that these common and sensible coping strategies might not always work. For now, I will introduce you to several new ways of responding to unpleasant experiences (Show the handout).

First, I would like to explain the following two points. In this handout, the points regarding the relationship between our thoughts or feelings and the actions we actually take were described. The first is that it is impossible to remove “bad” thoughts or feelings. And the second is that thoughts or feelings are not the cause of our behavior.

Now, let’s look at the first point that it is impossible to remove “bad” thoughts or feelings. Our common coping strategy is to actively try to remove thoughts, feelings, or sensations evaluated as “bad.” This can sometimes work temporarily; therefore, it is often performed repeatedly. Have you ever had experiences where you have felt temporarily refreshed by distraction when you felt unpleasant? However, does this coping always work? How about in the long term? In fact, recent research has shown that this coping strategy is often counterproductive and problematic in the long run.

Can you stand up, please? Since you woke up today, have you thought about “the pink elephant?” I bet you haven’t. Now, I will ask you not to think about the pink elephant for one minute. Don’t think about any images. Never think about the “pink elephant,” and walk around in this room while you are not thinking about it. Please try to never think about it and walk as long as possible. If you think about it, stop walking and stay in that place [60 seconds].

How was it? It’s impossible, isn’t it? In fact, it is a very difficult task to intentionally try to eliminate thoughts, feelings, or sensations. I think you have experienced that this strategy often prevents you from doing what you want or should do. Many studies have shown that sometimes we can suppress unpleasant experiences; however, in many cases, they quickly return or do so more intensely.

Part B

Now, let’s look at the second point, that thoughts or feelings are not the cause of our behavior. Typically, we think of thoughts, feelings, or sensations as a cause of our behavior; for example, missing class because of feeling bad or using medicine because of having an itch. That’s the general and common sense feeling. However, this common sense is not always true. Therefore, let’s perform a little exercise.

Migrate to a different script for each group. See Methods section.

Let’s think about how we can actually deal with it. After this, I would like to ask you to retry the cold-pressor task again. In preparation for the task, you will be practicing how to respond to pain and its related thoughts or feelings, using the example of the party previously mentioned. Imagine that you are looking down on the scene of the party from the second floor. You can see the participants chatting and eating delicious meals. You might even see yourself in that scene. As you imagine it, various thoughts, feelings, or memories of the past event will surface. I would like you to imagine them as the peer/ Joe is doing bad things and then let it go. It is important not to try to eliminate or avoid thinking about them because doing so would result in a “pink elephant.” Therefore, I would like to ask you to try to have an attitude of continuing to observe the situation. For example, when the thoughts such as “I want to quit” or “I’m tired” arise, imagine that the

peer/Joe is shouting that and maintain an attitude of observation. When you notice that you are no longer looking down on the party, return to that image and resume the exercise. Have you figured out how to do this? (Three minutes to exercise and moving to Phase 4)

Control group

Do you know how the senses are generated? I would like to provide a brief explanation of the mechanisms and functions of the senses.

First, there are three main types of senses: somatic senses, visceral senses, and special senses. The so-called five senses are categorized as somatic and special senses. As you know, the five senses are sight, hearing, taste, smell, and touch. These senses are generated by external stimuli. The organs that receive these stimuli are called sensory organs. Organisms, including humans, have a variety of sensory organs, each of which can receive only a certain type and range of stimuli. For instance, the human eye can only receive visible light with a short wavelength of 360-400nm and a long wavelength of 760-830nm. The optimal stimulus that can be received by a certain sensory organ is called the adequate stimulus, and the range of intensity that can be received is called the threshold. Since each sensory organ can only receive a specific stimulus, organisms have various sensory organs. For instance, the photoreceptor cells that produce vision receive light, and the hair cells of the organ of Corti that produce hearing receive sound. In this case, light is the adequate stimulus for the visual nervous system, and sound is the stimulus for the auditory nervous system. However, visual sensations may be produced when neural activity somewhere in the visual nervous system occurs, even in the absence of an adequate stimulus. For instance, when hitting the head or placing pressure on the eyes, the visual nerves are pushed and become active, and something like a light may be felt. Have you ever experienced something like this? The stimuli that cause this kind of sensation are called inadequate stimuli.

Subsequently, the stimuli received by the sensory organs are transmitted to the brain, and they are used as information for the organism to respond to the outside world. Through the received stimuli, organisms become aware of the world outside of themselves.

Sensations are also an important research topic in the field of psychology. For a long time, there has been a study called psychophysics. Our sensory nervous system responds to physical stimuli. If the amount of physical stimulation from the outside world is small, sensation may not occur, however, if the amount is large, it occurs. Thus, to measure the corresponding psychophysical quantity such as whether we see light or not by operating the physical quantity of stimuli (such as intensity of light or sound) is called psychophysical measurement. By adjusting the amount of stimulus, we can find the value at the absolute threshold of the sensation. Therefore, the absolute threshold is the lowest stimulus intensity required to produce a certain sensation. In contrast, the minimum difference we can find between two stimuli is called the discrimination threshold. The visual acuity test that we perform when we acquire glasses or contact lenses is also measuring a kind of threshold, in this case, the minimum readable range.

Now, we are going to investigate which part of our body can easily discriminate between two points using this caliper (Give participant a caliper). Try touching various parts of your body to find out which parts can discriminate between two points and which parts cannot (Experimenter should wait for a while). Next, try changing the size of the two points and see how many millimeters you can discriminate between the two points (Experimenter should wait for a while).

I think you found that there is a difference between the parts that are easily discriminated against and those that are not. In general, it is thought that this depends on the density of receptors that receive the stimulus and the size of the area in charge of the cortical sensory cortex. Therefore, the two-points discrimination threshold on the dorsum is

60-70mm, while it is said to be 3-5mm for the fingers. The density of touch or pressure spot on the body surface is inversely proportional to the size of the two-points discrimination threshold. This is higher on the fingertips and lips, and lower on the upper arms, lower legs, and back. Therefore, the threshold of the tactile pressure is lower in the former and higher in the latter. This means that fingertips and lips are more sensitive to touch.

Now, move on to the next section. When you placed your hand in the cold water a short while ago, I think you felt pain. There is extensive research on pain in the field of clinical psychology. For instance, intervention methods for chronic pain have been developed. However, today I would like to discuss cognitive behavioral therapy. In CBT, the focus is how the patient understands, thinks about, and behaves in response to painful stimuli. The idea is to support patients to consider what their thoughts about pain mean, to sort out what motivational or emotional problems and physical change they experience, and to help them learn how to cope in their daily lives. I would now like to briefly explain the described method (Show the handout).

Cognitive restructuring is a method of correcting the thought process that leads to negative perceptions of pain in a different, more positive, and realistic way. A concrete example is to think positively when pain occurs such as "I can handle it."

Visual imagery is a method of imagining a calming scene such as a natural landscape with closed eyes.

Distraction is a method of directing attention to stimuli other than pain in order to reduce the focus on the pain. Examples include watching TV or reading a book.

In progressive muscle relaxation, patients relax a specific muscle group by using the mechanism of muscle contraction and relaxation. The patients sit comfortably and apply force to a body part such as the shoulders, arms, or legs for five seconds, then relax it repeatedly.

Pain education is designed to educate and deepen the understanding of pain. It is often conducted in hospitals because a specialist provides a lecture.

Pleasurable activity planning involves making plans for enjoyable activities such as making travel plans or weekend plans.

Activity pacing involves planning pacing activities that take activity time into account. It attempts to control pain by setting the activity time to a shorter duration than the time when the pain begins.

Finally, modeling is learning (by observation) the efforts of others who are in pain. The methods include listening to people who have been able to endure their pain through exercise.

Now that I have briefly explained pain control, are there any coping strategies that you use regularly? (Moving to the Phase 4).