



<b>Title</b>	Persuasion Game : Cross Cultural Comparison
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<b>Citation</b>	Simulation & Gaming, 50(5), 532-555 <a href="https://doi.org/10.1177/1046878119880236">https://doi.org/10.1177/1046878119880236</a>
<b>Issue Date</b>	2019-10-01
<b>Doc URL</b>	<a href="http://hdl.handle.net/2115/76257">http://hdl.handle.net/2115/76257</a>
<b>Rights</b>	Kaori Ando, Junkichi Sugiura, Susumu Ohnuma, Kim-Pong Tam, Gundula Hübner, Nahoko Adachi, Persuasion Game : Cross Cultural Comparison , Simulation & Gaming (Vol.50(5)) pp. 532-555. Copyright © 2019 (The Author(s)). DOI: 10.1177/1046878119880236.
<b>Type</b>	article (author version)
<b>File Information</b>	Ando_Sugiura_Ohnuma_etal.pdf



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## Persuasion Game: Cross-cultural comparison

### *Abstract*

#### Background.

This study aims to examine the effectiveness of a “persuasion game” (Sugiura, 2003) in changing environmental attitudes and behaviors in different cultural contexts. Although the importance of personal communication on facilitating environmental behaviors are pointed out, environmental communication in our daily life is not frequent.

#### Intervention.

In the present study, we tested the effect of persuasion game (Sugiura, 2003) in Germany, Hong Kong and Japan. In the game, participants were divided into two groups: persuaders and persuadees. The persuaders tried to persuade as many persuadees as they could in 10 minutes to adopt energy-saving behaviors. After 10 minutes, the roles of persuaders and persuadees were interchanged.

#### Method.

In this study, with a quasi-experimental pretest/posttest design, we examined changes in attitudes and behavioral intention regarding energy-saving from before to after the persuasion game. Participants were university students in Germany ( $N=116$ ), Hong Kong ( $N=65$ ), and Japan ( $N=92$ ).

#### Results.

Confidence in persuasion and frequency in environmental communication with

others were the lowest in Japan, although the persuasion game itself was judged most positively there. Intention of adopting energy-saving behavior, perceived seriousness of environmental problems, descriptive norm, and subjective norm were all higher after playing the persuasion game in all three countries. The increase in subjective norm was especially high in Japan. Also, in Japan, the increase in intention to adopt energy-saving behavior was particularly pronounced among those who had less environmental communication.

#### Discussion.

These results indicate that the persuasion game can not only facilitate communication on environmental issues in different cultural contexts but also change the perception on other people's interests in environmental issues. The game evaluation was high in all three countries, which showed that even for those who are not accustomed to persuade others, persuasion game can be enjoyable, or can have greater impacts.

#### Limitations and suggestions for further future research.

Limitations of the present study in applicability of the result is that the game were played only by university students, and it was conducted in only three countries.

#### Conclusion.

The present study showed that persuasion game can be played in countries other than Japan as well. The study also showed that persuasion game can be an opportunity to have communication with others on environmental issues, which may contribute to promote future environmental behaviors.

**Keywords:** Role-playing, Pluralistic ignorance, Persuasion, Environmental behavior, Environmental communication



## **Background**

Climate change is an issue that all countries must tackle together. It is expected that if the current trend of CO<sub>2</sub> emissions continues, the world will experience severe environmental changes, including not only temperature rises but also increased frequency of flooding, typhoons, and droughts (IPCC, 2013). Under such circumstances, reducing CO<sub>2</sub> emissions requires serious changes in individuals' environmental behaviors. In this regard, environmental education plays a crucial role.

In this paper, we test an interactive game, named the "Persuasion Game" (*Settoku-Nattoku* game, Sugiura, 2003), as a tool for environmental education. In the Persuasion Game, participants are divided into two groups, and one group's members try to persuade the other group's members to adopt environmental behaviors. It is expected that the role-playing experience induces changes in participants' own attitudes. This game was first developed in Japan, where its effectiveness has also been tested (Sugiura, 2003, 2008, 2009). In this study, we examine how individuals from other countries (specifically Germany and Hong Kong) react to the game.

### ***The role of communication in environmental behaviors***

To reduce climate change, it is crucial that many people change their daily behaviors to increase sustainability. However, it is not easy to change individual behaviors. Several studies have identified gaps between perceived environmental risks and behaviors (e.g., Arbuthnot, 1977; Oskamp, Harrington, Edwards, Sherwood, Okuda, & Swanson, 1991; Tobler, Visschers, & Siegrist, 2012). That is, even though people believe that environmental issues are serious, they do not necessarily change their

behaviors accordingly.

While the limited effects of providing information through mass media have been recognized (e.g., Klöckner, 2015; Staats, Wit, & Midden, 1996), personal communications have been found to effectively facilitate environmental behaviors (e.g., Ando & Hirose, 1999; Archer, Pettigrew, Costanzo, Iritani, Walker, & White, 1987; Costanzo, Archer, Aronson, & Pettigrew, 1986; Nonami, Sugiura, Ohnuma, Yamakawa, & Hirose, 1997). For example, Nonami et al. (1997) compared the effects of mass media, local media, and personal communications on recycling behaviors, and found that only personal communications can directly increase recycling behaviors. Personal communications also affected recycling behavior indirectly through the subjective norm; this finding implies that personal communications deliver not only factual information about the environment but also insight into other people's thoughts and behaviors. Even for costly behaviors such as buying photovoltaic devices, information from close others has been found to be the strongest determinant (Archer et al., 1987). Costanzo et al. (1986) argued that information received through the personal channel is usually more favorably evaluated and remembered, and hence more likely to influence behaviors. Costanzo et al.'s (1986) arguments are in line with Fujii's (2003) contention that when the intended recipient of a message is unclear, communication typically fails. Only when people perceive that a message is targeted at them can they be motivated to attend to it. Overall, these studies hint at the potential effectiveness of personal communications in the promotion of environmental behaviors.

Despite the potential importance of personal communications in facilitating environmental behaviors, conversations with family members and friends on environmental issues seem to be rather rare (Capstick, Demcki, Sposato, Pidgeon,

Spence & Corner, 2015; Leiserowitz, Maibach, Roser-Renouf, Feinberg, & Rosenthal, 2015). Environmental communication is particularly infrequent in Japan compared to other countries such as Germany, United States, and China (Ando, Ohnuma, Blöbaum, Matthies, & Sugiura, 2010; Ando, Ohnuma, & Chang, 2007; Ando, Ohnuma, Hübner, & Schultz, 2015). The infrequency of environmental communication may be due to a tendency to believe that others are not interested in the topic. Geiger & Swim (2016) argued that “pluralistic ignorance”—the misperception by most people that few are interested in environmental issues—contributes to the lack of environmental communication. They also argued that pluralistic ignorance leads people to avoid discussing environmental issues for fear of being evaluated negatively by those who do not share their opinion. In their study, participants with higher confidence that others are concerned about climate change were more willing to discuss the issue with them; moreover, correcting pluralistic ignorance increased willingness to discuss climate change.

Based on Geiger & Swim’s study (2016), it is conceivable that the Persuasion Game affords an opportunity for people to discuss environmental issues with others. Because participants in the game are assigned the role of persuading others to adopt environmental behaviors, they have no need to fear either negative evaluation by others or being in a minority, given that all participants engage in the same task in the game.

### ***Cultural differences***

Cross-cultural psychology research suggests that in Asian countries such as Japan and Hong Kong, interdependent self-construal is more dominant, while in Western countries such as Germany, independent self-construal is more dominant (Markus &



Kitayama, 1991). According to Markus & Kitayama (1991), in countries where the interdependent cultural construct dominates, people place importance on keeping harmonious relationship with others, while in countries that emphasize independence, pursuing one's own values is prioritized.

However, Hong Kong citizens are also acculturated by Western beliefs and values (Bond, 1993). Hong Kong was a British-governed territory for over a century. It has been reported that Hong Kong Chinese citizens are rather westernized in their self-concept and value system (Bond & Cheung, 1981; Fu, 1999; Triandis, Leung, & Hui, 1990), yet they also maintain their identity as Hong Kong Chinese (Hong, Yeung, Chiu & Tong, 1999). Hong, Morris, Chiu, & Benet-Martinez (2000) concluded that Hong Kong Chinese individuals are bicultural. Therefore, Hong Kong Chinese participants in the present study may respond to the Persuasion Game in ways that are more similar to German students than to Japanese students.

In Japan, previous studies have shown that people try to maintain harmonious relationships with others (Kitayama & Karasawa, 1995; Markus & Kitayama, 1991). Prioritizing harmonious interpersonal relationships results in the avoidance of conflicts and arguments with others (Hayashi, 2009). In Japan, people try to read others' minds and act in accordance with others' expectations. Consequently, Japanese people are not used to arguing with others, which means that they are also unaccustomed to persuading others. Indeed, Nakano (2011) reported that Japanese students scored lowest in argumentativeness (i.e., positive attitude toward arguments) in a sample of students from various countries.

For the above reasons, we predict that Japanese participants will have less confidence in persuasion in the Persuasion Game than do participants from Germany

and Hong Kong. We will specifically explore the extent to which confidence in persuasion influences responses to the Persuasion Game.

Sugiura & Motosu (2013) conducted the Persuasion Game in both Germany and Japan and found generally high motivation to play the game in both countries. German participants asked more questions before playing the game, but the game itself proceeded in the same way. Sugiura & Motosu (2013) also found that role-playing in the game affected behavioral intention in Germany (see also Horsley, 1977). In Japan, mean scores for (1) gaining new knowledge of environmental behaviors by playing the game and (2) consistency between daily behavior and contents of persuasion in the game were both higher than in Germany; both these variables affected behavioral intention in Japan (Sugiura & Motosu, 2013).

These results suggest that, in Japan, gaining new knowledge through the game and consistency with reality play important roles in affecting intention to adopt environmental behavior. Japanese participants may have feared that advocating something inconsistent with how they act in real life would lead to later criticism by others. This tendency may be rooted in limited opportunities to argue with others in daily life. However, Sugiura & Motosu (2013) did not measure confidence in persuasion. Therefore, we aim to explore the influence of confidence in persuasion in this study.

### **Intervention**

In this study, university students in Germany, Hong Kong, and Japan were recruited to play a version of the Persuasion Game. The game was originally developed by Sugiura (2003) as an educational game to promote environmental behaviors. He first

developed the game while a member of the “Nagoya Rule Forum,” with the aim of reducing waste in Nagoya, Japan. The game was first played in 2000, after various ideas for reducing waste were presented by participants of the forum. It essentially applies the role-playing method in environmental education, as first suggested by Horsley (1977). Bandura & Walters (1963) argued earlier that role-playing in a social learning situation is useful because the behavior one role-plays can be reinforced thereby. Horsley (1977) asked his students to persuade their friends or family members to adopt environmental behaviors and observed that persuading others was associated with increased environmental behaviors among the participants themselves. The effect of role-playing has also been found to change smoking behavior. In Elms’s (1966) study, participants asked to role-play convincing other smokers to quit showed more change in their attitude than those who did not have opportunity to convince others toward quitting smoking. Similar effects have also been shown in other areas (e.g., reducing dogmatism and ethnocentrism: Bredemeier, Bernstein, & Oxman, 1982; enhancing cooperation: Williams & Williams, 2007).

The Persuasion Game has been played in various occasions, and its effectiveness in environmental education has previously been reported (Sugiura, 2008, 2009). However, its application is not limited to environmental behaviors: the Persuasion Game has been successfully applied in relation to consumer education (Sugiura, 2007); acceptance of wind turbines (Motosu, Sugiura, Kato, Koga, & Arakawa, 2009); and health behaviors (Nishigaki, 2008), among other issues.

The procedures of the Persuasion Game in this study were as follows. At least one facilitator administered the game. At the very beginning, all participants were requested to write down on a card the energy-saving behavior they wanted to encourage

others to adopt. They were told that original and specific ideas would be more appreciated than general ideas. The time allowed for writing down ideas was 8 to 10 minutes. Participants conceiving multiple ideas were required to choose only one idea to use in the game. In some previous studies using the Persuasion Game, the facilitator has provided participants with the behavior they should seek to persuade others to adopt. However, since we were conducting the game in multiple countries, and it is likely that the feasibility and meaning of environmental behaviors vary between countries, we opted to require participants to conceive their own ideas. We also expected that participants would have stronger motivation to persuade others to adopt energy-saving behaviors they personally chose to use.

When the Persuasion Game started, persuaders stood in corridors where they could move around freely, while persuadees sat on chairs and waited for the persuaders to come to them. Persuaders were given 10 minutes to try to persuade as many persuadees as they could to adopt the energy-saving behavior that they wrote down on the card before the game. Persuaders picked one persuadee at a time to attempt to persuade, and were instructed to keep persuading a persuadee until they indicated that they were either convinced or not convinced; they could then move on to attempting to persuade another persuadee. From each persuadee, a persuader would receive either a blue sticker (indicating “I am persuaded”) or a red sticker (indicating “I am not persuaded”).

Persuadees were asked to challenge or pose as many questions as possible to the persuader and not to immediately accept a persuader’s arguments. Persuaders and persuadees switched roles after 10 minutes.

Each participant’s score for the Persuasion Game was calculated with this

formula:  $\text{Score} = \text{number of blue stickers} \times 3 + \text{number of red stickers}$ . In Sugiura & Motosu's (2013) study, the score was calculated with a slightly different formula:  $\text{score} = \text{number of blue stickers} \times 2 + \text{number of red stickers} \times -1$ . We changed the scoring for red stickers from negative to positive so that even unsuccessful persuasion could still reinforce the participants' efforts. This likely reduced participants' fear of failing in a persuasion attempt.

After the game's completion, the three participants with the highest scores each received a prize (some snacks worth approximately 300 Japanese Yen, or around 3 US Dollars) from the facilitator.

## **Methods**

### ***Research objectives***

This research aims to assess the effectiveness of the Persuasion Game in changing environmental attitudes and behavior in different cultures.

### ***Research questions and hypothesis***

This study used a quasi-experimental pre-test/post-test design to examine changes in attitudes and behavioral intention regarding energy-saving from before to after participating in the Persuasion Game in three countries/regions: Japan, Germany, and Hong Kong. Our hypotheses are as follows:

1. Playing the Persuasion Game increases participants' intention to adopt energy-saving behaviors.

2. The opportunity provided by the game to engage in environmental communication with others changes people's perception of others' concern about environmental issues.
3. Japanese participants have lower confidence in persuasion than participants from Germany and Hong Kong.

We do not hypothesize how the level of confidence in persuasion influences one's performance in the Persuasion Game, but will explore this issue in this study. In addition, we will also perform a series of exploratory analyses to identify the determinants of the three behavioral intention measures (i.e., change in intention to adopt energy-saving behaviors, behavioral intention (self-generated behavior), and behavioral intention (other-generated behavior)). These analyses should enable better understanding of the associations between different aspects of the gaming experience and intention to adopt pro-environmental behavior.

### ***Participants***

In Germany, 116 university students participated in the Persuasion Game, with six sessions conducted across two universities (female: 80, male: 35, unknown: 1). In Hong Kong, 65 students from one university participated in either of two sessions (female: 37, male: 28). In Japan, 92 students participated in three sessions across three universities (female: 64, male: 25, unknown 3). The average age of participants was 21.5 years old in Germany, 21.1 years old in Hong Kong, and 20.3 years old in Japan.

In Germany and Japan, the Persuasion Game was played as a part of a regular class, whereas participants in Hong Kong were recruited through university-run

recruiting systems.

This study was conducted following the ethical requirements established by the Japanese Psychological Society. It was also approved by the research practice committee of Hong Kong University of Science and Technology.

### ***Instruments***

The study was conducted in Japanese in Japan, and in English in Germany and Hong Kong. Measures for environmental communication, descriptive norm, subjective norm, and behavioral intention were taken from a previous study (Ando, Ohnuma, Hübner, & Schultz, 2015); for these measures, English and Japanese versions were already available. The other measures were first constructed in Japanese, then translated into English, and finally verified by back-translation.

#### **Pre-game questionnaire**

Participants completed the following scales in the pre-game questionnaire. Their responses were coded on a 5-point scale (from 1 = not agree at all to 5 = agree extremely).

*Confidence in persuasion.* This was measured with four items (e.g., “I think I can persuade others well”); the scale’s Cronbach’s alpha values were .64 in Germany, .84 in Hong Kong .84, and 0.84 in Japan.

*Frequency in environmental communication.* This was measured with three items regarding discussion of energy-saving with close others: “I talk about energy-saving behaviors with my university friends”; “I talk about energy-saving behaviors with my family”; and “I talk about energy-saving behaviors with my close friends.” The scale’s Cronbach’s alpha were .83 in Germany, .88 in Hong Kong, and .69 in Japan.

*Seriousness perception.* Participant-perceived seriousness of environmental

issues was measured with three items (e.g., “The increase in energy consumption is a serious problem for the global climate”). The scale’s Cronbach’s alpha were .82 in Germany, .84 in Hong Kong, and .69 in Japan.

*Descriptive norm.* This was measured with a single item asking participants to report their perception of other people’s energy-saving behaviors: “Many people are conducting the energy-saving behaviors.”

*Subjective norm.* This was also measured with a single item: “My friends expect me to conduct energy-saving behaviors.”

*Perceived behavioral control.* This was measured with a single item asking participants how easy it is to adopt energy-saving behaviors: “It is easy for me to conduct energy-saving behaviors.”

*Behavioral intention.* Intention to conduct energy-saving behaviors was measured with four items: “I would like to try to save energy as much as possible”; “I intend to conduct energy-saving behaviors from now on”; “I intend to avoid using heating or air conditioning too much from now on”; and “I intend to buy products that consume less electricity from now on.” The scale’s Cronbach’s alpha were .77 in Germany, .77 in Hong Kong, and .81 in Japan.

### **Post-game questionnaire**

Immediately after the game, participants completed the following measures on a 5-point scale (from 1 = not agree at all to 5 = agree extremely).

*Self-assessed success in persuasion.* Participants’ assessment of their success in the Persuasion Game was measured using six items (e.g., “I could persuade others actively when I was a persuader”). The scale’s Cronbach’s alpha values were .76 in Germany, .89 in Hong Kong, and .82 in Japan.



*Gaining new knowledge.* Participants' self-reported gain in knowledge on energy-saving behaviors from participating in the game was measured using three items (e.g., "I acquired new knowledge about energy-saving behaviors through being persuaded"). The scale's Cronbach's alpha values were .81 in Germany, .82 in Hong Kong, and .58 in Japan.

*Evaluation of the game.* Participants' evaluation of the Persuasion Game was measured with five items (e.g., "I enjoyed the game"; "I am glad that I played this game"). The scale's Cronbach's alpha values were .79 in Germany, .79 in Hong Kong, and .78 in Japan.

*Behavioral intention (self-generated).* Intention to adopt the behavior participants attempted to persuade others to adopt was measured with a single item: "I intend to conduct the energy-saving behavior that I presented for persuasion in today's game from now on." The scale's Cronbach's alpha were .78 in Germany, .75 in Hong Kong, and .81 in Japan.

*Behavioral intention (other-generated).* Intention to adopt the behaviors promoted by others was measured with a single item: "I intend to conduct the energy-saving behaviors that I was persuaded to adopt in today's game from now on."

Seriousness perception (Germany:  $\alpha = .80$ , Hong Kong:  $\alpha = .87$ , Japan:  $\alpha = .81$ ), descriptive norm, subjective norm, perceived behavioral control, and behavioral intention (Germany:  $\alpha = .78$ , Hong Kong:  $\alpha = .75$ , Japan:  $\alpha = .81$ ) were also measured in the post-game questionnaire; the measures were identical to those in the pre-game questionnaire. For each participant, a mean score was calculated for each scale.

### ***Research protocol***

The sequential procedures in this study were as follows:

1. Participants completed the pre-game questionnaire.
2. The facilitator asked participants to write down the energy-saving behavior they would attempt to persuade others to adopt in the game.
3. Participants were divided into two groups, “Persuader” and “Persuadee.” The Persuasion Game then began.
4. The time allotted for persuasion was 10 minutes. After this period elapsed, the persuaders and persuadees switched roles.
5. After both groups had performed both roles, participants completed the post-game questionnaire.
6. Participants calculated their score in the game (indicating their actual performance); the three participants with the highest scores each received a prize (low-value snacks) from the facilitator.

The total time required for every stage in the procedure was approximately one hour.

### ***Statistical analysis***

IBM SPSS Statistics 25 was used for analyzing the data. Analysis of variance (ANOVA) and regression analysis were used to test the hypothesized effects of the Persuasion Game.

## Results

### *Changes in environmental attitudes and intention before and after the game*

To test Hypotheses 1 and 2, two-way ANOVAs were conducted with behavioral intention, seriousness perception, descriptive norm, and subjective norm separately as the dependent variable, with country and time (pre-game vs. post-game) as the independent variables. The results showed that, for behavioral intention, the main effect of time was significant ( $F(1, 270) = 122.33, p < .001$ ; partial  $\eta^2 = .31$ ). In all three countries, behavioral intention to conduct energy-saving behaviors was higher after playing the Persuasion Game (see Fig. 1). The main effects of country and the interaction terms were not significant. Therefore, Hypothesis 1 was supported.

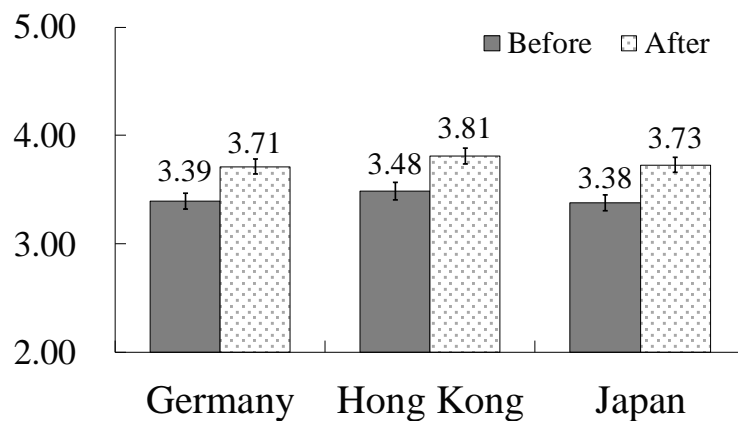


Figure 1

*Mean scores of behavioral intention to conduct energy saving behavior before and after the game*

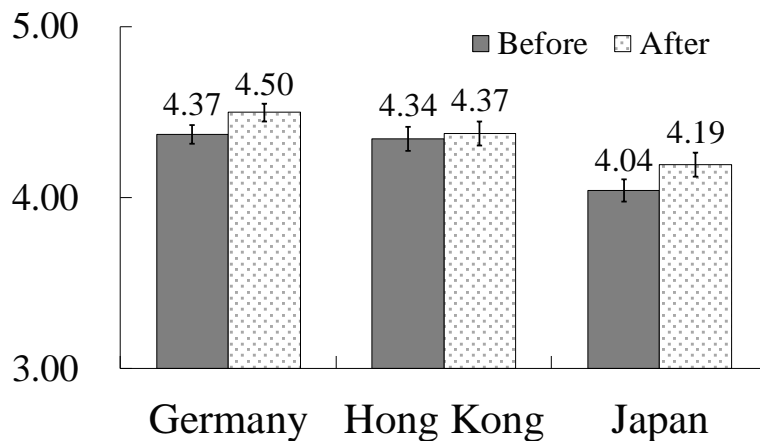


Figure 2

*Mean scores of seriousness perception before and after the game*

In the two-way ANOVA for seriousness perception, the main effects of country ( $F(2, 270) = 8.46, p < .001$ ; partial  $\eta^2 = .06$ ) and time ( $F(1, 270) = 15.64, p < .001$ ; partial  $\eta^2 = .05$ ) were significant, while the interaction term was not significant. Seriousness perception was higher post-game in all three countries. Results from a Student-Newman-Keuls test (S-N-K test) revealed that Japanese participants scored significantly lower than participants from Germany and Hong Kong, between whom there was no significant difference (see Fig. 2).

In the two-way ANOVA for the descriptive norm, time had a significant main effect ( $F(1, 268) = 27.49, p < .001$ ; partial  $\eta^2 = .09$ ), but neither country nor the interaction term had significant effects. Participants showed higher scores in the descriptive norm after playing the Persuasion Game in all three countries (see Fig. 3).

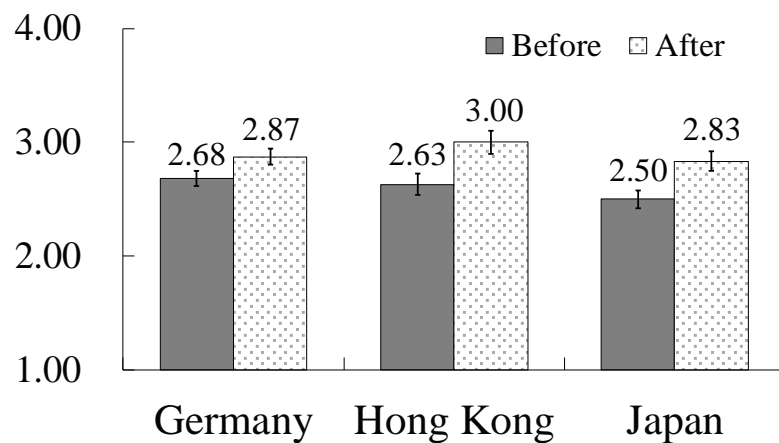


Figure 3

*Mean scores of descriptive norm before and after the game*

In the two-way ANOVA for the subjective norm, the main effects of country ( $F(2, 270) = 11.59, p < .001$ ; partial  $\eta^2 = .08$ ), time ( $F(1, 270) = 78.19, p < .001$ ; partial  $\eta^2 = .22$ ), and the interaction between country and time ( $F(2, 270) = 12.40, p < .001$ ; partial  $\eta^2 = .08$ ) were all significant. The subjective norm was higher post-game in all three countries. An S-N-K test revealed that Japanese participants scored significantly lower than participants from Germany and Hong Kong, between whom there was no significant difference (see Fig. 4). As the interaction effect was significant, we conducted a simple main effect analysis of time. The simple main effect of time was significant in all three countries (Germany:  $F(1, 270) = 10.17, p < .01$ ; Hong Kong:  $F(1, 270) = 9.99, p < .01$ ; Japan:  $F(1, 270) = 85.37, p < .001$ ); that is, the subjective norm significantly increased after the game in all three countries. The simple main effect of country was only significant in the pre-game questionnaire ( $F(2, 540) = 21.78, p < .001$ ). Before playing the Persuasion Game, Japanese participants scored significantly lower than German and Hong Kong Chinese participants. Post-game, there was no significant

difference among the countries, demonstrating that change in the subjective norm was especially large in Japan.

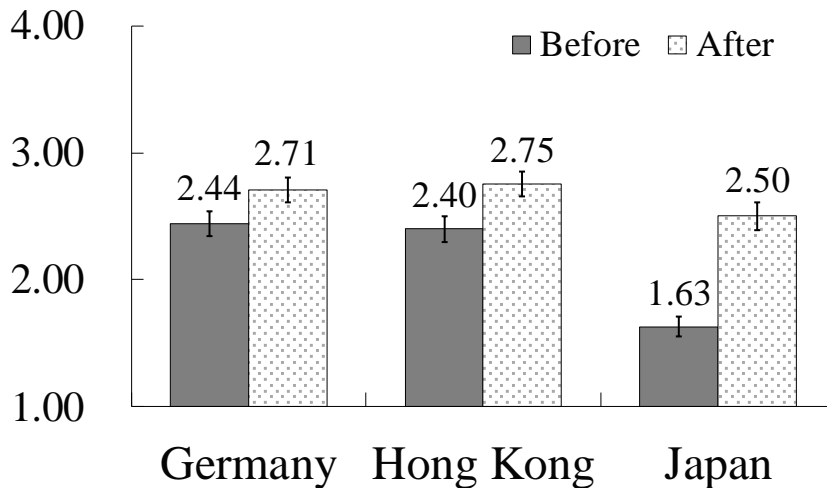


Figure 4

*Mean scores of subjective norm before and after the game*

Since both the descriptive norm and subjective norm were higher after the Persuasion Game in all three countries, it can be concluded that playing the game effectively changed participants' perception of other people's concern over environmental issues. After the game, our participants perceived that more people were engaging in energy-saving behaviors, and perceived that their friends had higher expectations for them to conduct energy-saving behaviors. Therefore, Hypothesis 2 was supported.

#### *Differences by country*

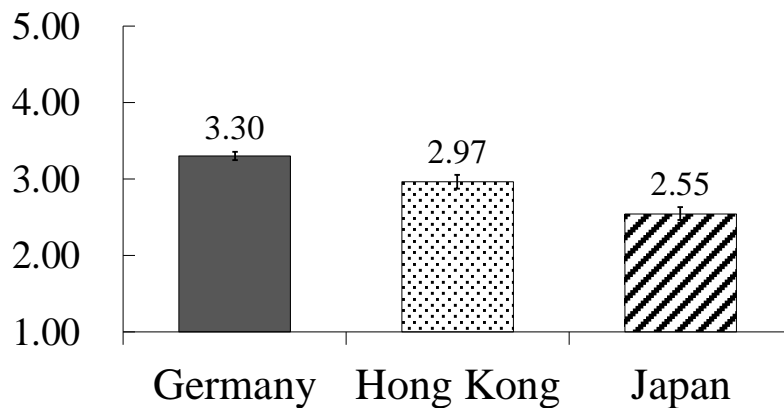


Figure 5

*Mean scores of confidence in persuasion*

We compared confidence in persuasion and frequency in environmental communication (measured in the pre-game questionnaire) across the three countries to test Hypothesis 3. For this purpose, we conducted one-way ANOVAs using country as the independent variable. Confidence in persuasion significantly differed between countries ( $F(2,270) = 31.39, p < .001$ ; partial  $\eta^2 = .19$ ). On an S-N-K test, German participants scored highest and Japanese participants lowest (see Fig. 5). These results support Hypothesis 3's prediction that Japanese participants have lower confidence in persuasion than participants from Germany and Hong Kong.

Frequency in environmental communication also significantly differed between countries ( $F(2,270) = 28.34, p < .001$ ; partial  $\eta^2 = .17$ ). An S-N-K test revealed that Japanese participants scored lowest, while German and Hong Kong Chinese participants did not differ significantly from each other (see Fig. 6). Overall, Japanese participants reported the lowest confidence in persuasion and frequency of environmental communication, as we had hypothesized.

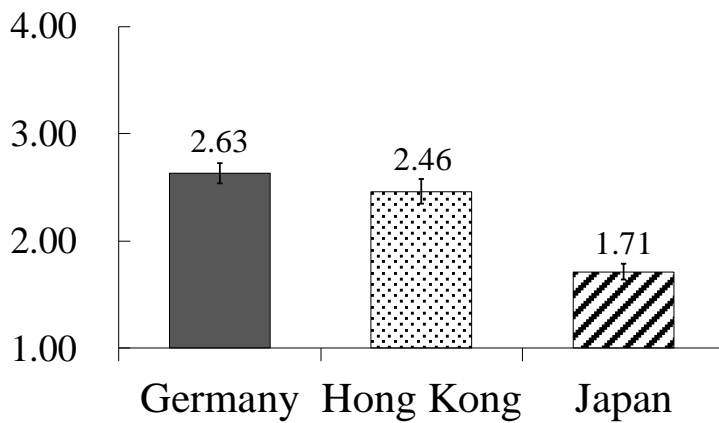


Figure 6

*Mean scores of frequency in environmental communication*

We then compared game evaluation (measured in the post-game questionnaire) across countries using a one-way ANOVA (see Fig. 7). The main effect of country was significant ( $F(2, 270) = 18.12, p < .001$ ; partial  $\eta^2 = .12$ ). An S-N-K test showed that Japanese participants scored significantly higher than participants from Germany and Hong Kong, between whom there was no significant difference. Confidence in persuasion was lowest among Japanese participants pre-game, but they ultimately enjoyed the game the most.



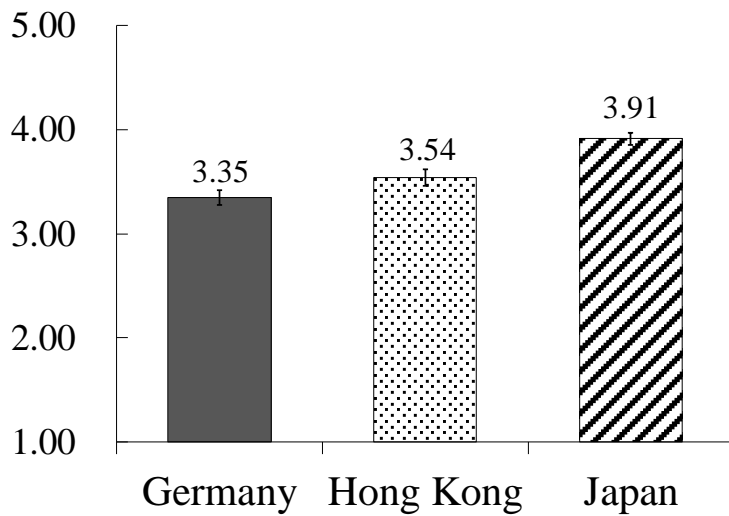


Figure 7

*Mean scores of game evaluation*

### ***Effect of confidence in persuasion***

We then explored whether participants' pre-game confidence in persuasion affected their experiences in the game. Participants were split into two groups—high confidence and low confidence—based on the median of their scores on confidence in persuasion for the subsequent analysis.

An two-way ANOVA with country and confidence in persuasion as independent variables and actual game performance as the dependent variable was performed. The results revealed a significant main effect of country ( $F(2,259) = 12.66, p < .001$ ; partial  $\eta^2 = .09$ ) and a significant interaction between country and confidence in persuasion ( $F(2,259) = 3.33, p < .05$ ; partial  $\eta^2 = .03$ ). On the main effect of country, an S-N-K test revealed that German participants scored significantly higher than participants from Hong Kong and Japan, between whom there was no significant difference (see Fig. 8).

A follow-up analysis showed that the simple main effect of confidence in persuasion was only significant in Germany ( $F(1,259) = 4.93, p < .05$ ).

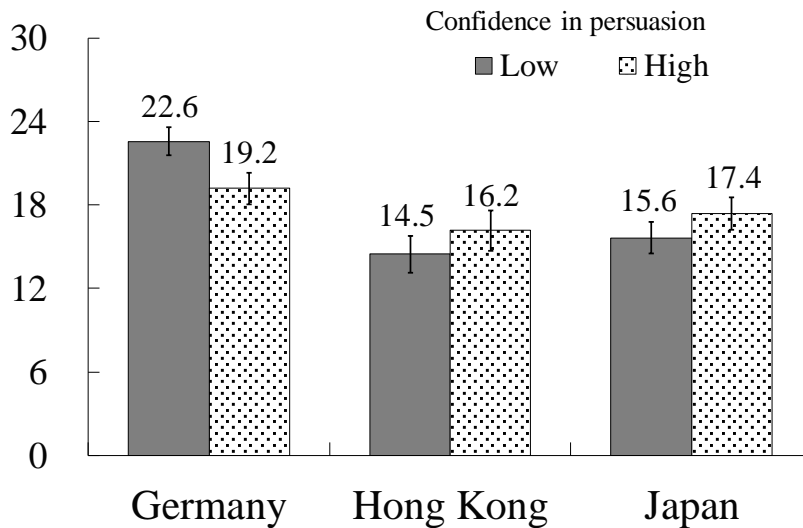


Figure 8

*Mean scores of game performance by confidence in persuasion*

Two-way ANOVAs with country and confidence in persuasion as the independent variables were also conducted with game evaluation and self-assessed success in persuasion as the dependent variables. For game evaluation, the main effects of country ( $F(2,267) = 18.08, p < .001$ ; partial  $\eta^2 = .12$ ) and confidence in persuasion ( $F(1,267) = 5.53, p < .05$ ; partial  $\eta^2 = .02$ ) were significant, but the interaction term was not significant. Those with high confidence evaluated the Persuasion Game more positively, and game evaluation was highest in Japan (see Fig. 9).

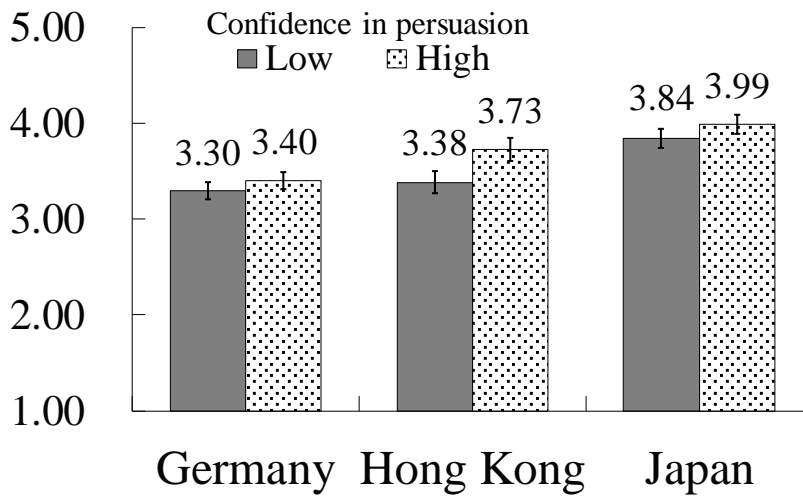


Figure 9

*Mean scores of game evaluation by confidence in persuasion*

For self-assessed success in persuasion, the main effects of country ( $F(2,267) = 22.80, p < .001$ ; partial  $\eta^2 = .15$ ), confidence in persuasion ( $F(1,267) = 42.29, p < .001$ ; partial  $\eta^2 = .14$ ), and the interaction term ( $F(2,267) = 5.35, p < .01$ ; partial  $\eta^2 = .04$ ) were all significant (see Fig. 10). An S-N-K test revealed that German participants scored significantly higher than Hong Kong and Japanese participants, between whom there was no significant difference. The simple main effect of confidence in persuasion was significant in Hong Kong and Japan, but not in Germany (Hong Kong:  $F(1,267) = 26.25, p < .001$ ; Japan:  $F(1,267) = 17.20, p < .001$ ). In Hong Kong and Japan, those with low confidence in persuasion gave lower assessments of their success in persuasion.

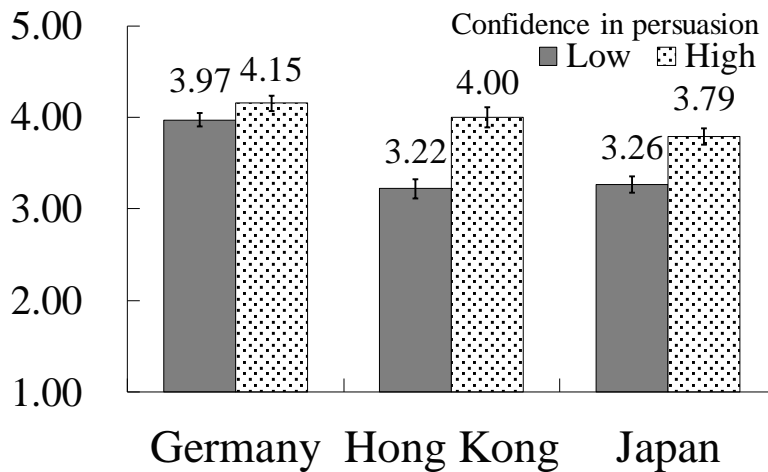


Figure 10

*Mean scores of self-assessed success in persuasion by confidence in persuasion*

### ***Determinants of intention to adopt energy-saving behaviors***

To investigate the determinants of the three kinds of behavioral intention (change in intention to adopt energy-saving behaviors, behavioral intention (self-generated), and behavioral intention (other-generated)), we conducted a regression analysis for each type and each country. In each analysis, variables that were significantly correlated with the intention variable were entered as predictors.

The results of the regression analysis for change in behavioral intention are reported in Table 1. Frequency in environmental communication was found to be a negative determinant of the intention to adopt energy-saving behaviors in Japan, although the effect was only marginally significant ( $\beta = -.18, p < .10$ ). This means that those who had less frequently engaged in environmental communication pre-game reported a greater change in their intention to adopt energy-saving behaviors through

playing the game. Change in the subjective norm was also found to be a significant and positive predictor in Hong Kong, while change in perceived behavioral control was found to be a significant and positive predictor in Germany.

Table 1

*Regression analysis for change in behavioral intention to adopt energy-saving behavior*

	Germany	Hong Kong	Japan
Frequency in environmental communication	-.09	-.14	-.18 †
Change in seriousness perception	.09	.05	.19 †
Change in descriptive norm	.03	.13	.01
Change in subjective norm	.17 †	.27 *	.04
Change in perceived behavioral control	.29 **	.15	.20 †
$R^2$	.14	.21	.12
$adjR^2$	.10	.14	.06
$F$ value	3.60 **	3.11 *	2.21 †

*Note 1* : \*\*\*  $p < .001$ , \*\*  $p < .01$ , \*  $p < .05$ , †  $p < .10$

*Note 2* : For the variables measured in both the pre-game and post-game questionnaires, change scores were always used; the scores were calculated by subtracting the score in the pregame questionnaire from the score in the post-game questionnaire.

The results of the regression analysis for behavioral intention (self-generated) are reported in Table 2. German and Japanese participants showed a similar tendency: seriousness perception, subjective norm, and success in persuasion each had positive effects on self-generated behavioral intention in both countries. In Hong Kong, by contrast, game evaluation was the only significant determinant: when participants perceived that the game was enjoyable, their intention to adopt self-generated behavior was higher.

Table 2

*Regression analysis for behavioral intention (self-generated behavior)*

	Germany	Hong Kong	Japan
Frequency in environmental communication	.02	.15	-.01
Seriousness perception	.22 *	.15	.22 *
Subjective norm	.18 †	.19	.33 **
Perceived behavioral control	.14	.14	.02
Success in persuasion	.26 **	.11	.24 *
Game evaluation	.00	.21 †	.12
$R^2$	.23	.25	.29
$adjR^2$	.19	.17	.24
$F$ value	5.38 ***	3.19 **	5.81 ***

*Note 1* : \*\*\*  $p < .001$ , \*\*  $p < .01$ , \*  $p < .05$ , †  $p < .10$

*Note 2* : The scores measured in post-questionnaire are used for seriousness perception, subjective norm, perceived behavioral control.

The results of the regression analysis for behavioral intention (other-generated) are reported in Table 3. Gaining new knowledge through being persuaded by others was found to affect behavioral intention in all three countries, and perceived behavioral control was also found to affect behavioral intention in Germany and Japan. The subjective norm had a positive effect on the behavioral intention in Hong Kong, while seriousness perception had an positive effect in Germany.

Table 3

*Regression analysis for behavioral intention (others-generated behavior)*

	Germany	Hong Kong	Japan
Frequency in environmental communication	.01	.16	.09
Seriousness perception	.26 **	.05	.14
Descriptive norm	.06	.00	.05
Subjective norm	.07	.31 *	-.02
Perceived behavioral control	.42 ***	.06	.27 **
Gaining new knowledge by being persuaded	.20 *	.37 **	.41 ***
Game evaluation	.07	.16	.02
$R^2$	.46	.36	.41
$adjR^2$	.43	.28	.36
$F$ value	12.63 ***	4.52 ***	8.06 ***

Note 1 : \*\*\*  $p < .001$ , \*\*  $p < .01$ , \*  $p < .05$

Note 2 : The scores measured in post-questionnaire are used for seriousness perception, descriptive norm, subjective norm, and perceived behavioral control.

## Discussion

We conducted the Persuasion Game in three countries: Germany, Hong Kong, and Japan. The aim was to examine to what extent playing the Persuasion Game can effectively enhance players' environmental attitudes and behavioral intention in multiple cultural contexts.

### *Changes in environmental attitudes and intentions through playing the Persuasion Game*

The results showed that after playing the game, the intention to adopt energy-saving behaviors, seriousness perception, descriptive norm, and subjective norm all increased significantly in all three countries. The game had positive effects on intention to adopt energy-saving behaviors, and also changed perceptions of others' concerns about environmental issues; these findings support Hypotheses 1 and 2. One reason for

these changes could be the effect of role-playing, as Horsley (1977) suggested. Through role-playing, participants could receive reinforcements for their actions to recommend energy-saving behavior, which in turn shaped their attitudes and behavioral intention.

The results also showed that the subjective norm was very low in Japan before playing the game; that is, participants perceived that others had low expectations that they should adopt environmental behaviors. However, this perception changed after playing the game: post-game, they perceived others' expectations of their environmental behaviors to be higher. The descriptive norm—the perception that other people commonly engage in environmental behaviors—also changed after playing the game in all three countries. Post-game, participants came to perceive that others are engaging more in environmental behaviors. That the subjective norm and descriptive norm were originally low may be attributable to many people lacking opportunities to discuss environmental issues with others in their daily lives. Frequency of environmental communication is especially low in Japan, which perhaps leads Japanese people to underestimate other people's concern about environmental issues, and thus be wary of negative evaluations from others if they raise environmental issues as conversation topics (Geiger & Swim, 2016).

This study demonstrated that by playing the Persuasion Game, our participants changed their perception of others' involvements in environmental issues. In other words, while it is known that pluralistic ignorance is a barrier to environmental communication in society (Geiger & Swim, 2016), our findings suggest that the Persuasion Game has the potential to change people's perception of others' opinions, and thereby break the spiral of silence on environmental topics. The regression analysis on change in behavioral intention to conduct energy-saving behavior revealed that the frequency of



environmental communication was negatively related to change in behavioral intention in Japan, indicating that those who had less frequently communicated with others on environmental issues underwent a bigger change in their behavioral intention by participating in the Persuasion Game. This result suggests that the game's impact is stronger on individuals who less frequently discuss environmental issues with others.

The regression analysis on intention to conduct the self-generated behavior revealed that self-assessed success in persuasion significantly affected intention to adopt self-generated behavior in Germany and Japan, while game evaluation affected this behavioral intention in Hong Kong. These findings indicate that individual success is important in Germany and Japan, while overall evaluation of the Persuasion Game itself was important in Hong Kong for motivating participants to themselves adopt the behavior they promoted during the game. For the intention to adopt other-generated behavior, gaining new knowledge was a significant determinant in all three countries. Sugiura & Motosu (2013) found that gaining new knowledge was a determinant of intention to adopt self-generated and other-generated behavior in Japan but not in Germany. By contrast, our study showed that gaining new knowledge affected intention to adopt other-generated behavior in Germany and Hong Kong. The process of persuasion may present persuadees with new ideas for energy-saving behaviors.

### ***Confidence in persuasion***

Consistent with Hypothesis 3, confidence in persuasion was lowest in Japan before the game. This may reflect the interdependent culture in Japan, wherein people try to avoid conflicts with others and thereby have fewer opportunities to persuade others. Also, the Japanese education system emphasizes maintaining harmony with others

(Tsuneyoshi, 1992). By contrast, in independent cultures, being independent from others and expressing one's own opinion directly are often deemed important (Markus & Kitayama, 1991).

However, Japanese participants evidently enjoyed the Persuasion Game, as evaluation of the game was highest in Japan (although those with high confidence in persuasion enjoyed the game even more). These results show that even for Japanese people who are not used to persuading others, the Persuasion Game can still be enjoyable.

Actual performance in the game was found to be higher for those with higher confidence in persuasion in Hong Kong and Japan, but the opposite was observed in Germany. It is plausible that German participants with low confidence in persuasion may have tried to compensate for this by attempting to persuade more people. Self-assessed success in persuasion was also higher for those with high confidence in Hong Kong and Japan but not in Germany. This may reflect the fact that German participants with low confidence performed better in the game than their compatriots with high confidence, as noted above.

### *Applicability of the Persuasion Game*

Our findings show that the Persuasion Game, originally developed in Japan, was highly evaluated by participants in all three studied countries. Even for people unaccustomed to persuading others, the Persuasion Game can be enjoyable, or even have greater impacts. In Germany and Hong Kong, the rules of the Persuasion Game were explained in English, but participants were allowed to talk in their own language during the persuasion activities of the game. It seems that language was not a barrier to them playing the game. In all three countries, participants generally appeared very keen to

persuade others in the game in observation by facilitators. It is often pointed out that Japanese are unaccustomed to arguing with others (Nakano, 2011), yet Japanese participants in the Persuasion Game actively talked to other participants without hesitation. They may have been motivated by achieving a high score in the game, or they may have just enjoyed receiving many stickers from others to confirm the acceptance of their persuasion.

### ***Limitations and suggestions for further future research***

A caveat should be noted when interpreting our findings: all of our participants were university students from only three countries. For further investigation of the usefulness of the Persuasion Game, replications using participants from diverse backgrounds and various other countries are needed.

## **Conclusion**

Despite these limitations, this study showed that the Persuasion Game can be played in countries other than Japan without major problems. The study also showed that the game presents an opportunity for players to communicate with others on environmental issues, which may contribute to promoting the adoption of environmental behaviors.

Previous studies have reported that people rarely converse with friends on environmental issues (Capstick, Demcki, Sposato, Pidgeon, Spence, & Corner, 2015; Leiserowitz, Maibach, Roser-Renouf, Feinberg, & Rosenthal, 2015). We may hesitate to choose environmental issues as conversation topics when unsure if others share our

interests. This study demonstrated that such a barrier to environmental communication can be removed with a game.

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### **Funding statements**

The present study was supported by JSPS Kakenhi 16K00749 awarded by the Japan Society for the Promotion of Science.

### **Conflict of interests**

The authors declare no potential conflict of interests with respect to research, financial aid, authorship, and publication of the article.