



KOCHI UNIVERSITY OF TECHNOLOGY

Social Design Engineering Series

SDES-2020-9

Can Individuals Caring Little about Future Generations Serve As Their Representatives?

Yoshinori Nakagawa

School of Economics and Management, Kochi University of Technology

Research Institute for Future Design, Kochi University of Technology

Tatsuyoshi Saijo

Research Institute for Humanity and Nature

Research Institute for Future Design, Kochi University of Technology

31st July, 2020

School of Economics and Management

Research Institute for Future Design

Kochi University of Technology

KUT-SDE working papers are preliminary research documents published by the School of Economics and Management jointly with the Research Center for Social Design Engineering at Kochi University of Technology. To facilitate prompt distribution, they have not been formally reviewed and edited. They are circulated in order to stimulate discussion and critical comment and may be revised. The views and interpretations expressed in these papers are those of the author(s). It is expected that most working papers will be published in some other form.

Can Individuals Caring Little about Future Generations
Serve As Their Representatives?

Abstract

How the future generation's voice can be institutionally reflected in current decision making has, for decades, attracted much attention from researchers and practitioners. To seek forms of institutionalization in which politicians elected through a conventional democratic process are allowed voluntarily to represent future generations' voices (rather than arbitrarily attaching power to representatives), this study established a model for the psychological process in which individuals experience future generations' perspective through deliberation, and this experience in turn motivates individuals to serve as future generations' voluntary representatives. A questionnaire survey was conducted with participants in a deliberative experiment (the number of observations was equal to 187), and factor analysis and structural equation modeling were applied. As a result, two psychological constructs "Disengagement from the present" and "Supportive attitude toward future generations" were identified, and psychometrically sound scales for these constructs were developed. Additionally, the structural equation model for these constructs was found to have acceptable goodness of fit. The present study contributes to deepening the debate on how one can find adequate or suitable candidates to fulfill roles as future generations' spokespersons and guardians.

Keywords: institutionalization; future generation; structural equation modeling; future design.

1. Introduction

Human societies face various intergenerational issues threatening their sustainability. In part, previous studies have ascribed these problems to the “presentism” (e.g., Thompson, 2010) inherent in our democratic society: We, in the present, are prone to over-discount future generations’ benefits in establishing laws and policies. To compensate for this deficit of democracy, a number of attempts have been made to consider how future generations’ voices can be institutionally reflected in current decision making. According to Jensen’s (2015) literature survey, Kavka and Warren (1983) first suggested that future generations ought to be represented in parliaments. Later, Dobson (1996) independently proposed that some seats in legislative assemblies be reserved for future generations’ representatives, elected by environmental groups and organizations. Ekeli (2005) extended this idea by proposing that all citizens should have the right to choose such representatives. Jensen (2015) called them “genuine representation of future generations” in contrast to institutionalization aiming to constrain or overlook conventional democratic processes. Included in this category is the proposal by Weiss (1992) to appoint and publicly finance an office responsible for ensuring that future generations are considered. More recently, Adachi (2018) classified forms of institutionalization into eight categories (including those *not* genuinely representative of future generations), for instance, constitutional provisions for protection of future generations’ well-being (Bunchanan & Wagner, 1977), transferring some of sovereign states’ authority to regional or global bodies (Low & Gleeson, 1998), and creating an independent governmental agency to review all regulations expected to impact future generations significantly and to coordinate among existing agencies (Mank, 1996).

Despite accumulation of these important academic contributions during the last three decades, the issue of practical, real-life institutional representation of future generations' voices remains unresolved. One reason for this failure seems to be that while earlier studies have considered forms in which power is attached to future generations' representatives, few have addressed mechanisms by which each individual, including the present generation's elected representatives, is motivated to overcome his or her presentism through deliberations enabled by such institutionalization. This argument seems consistent with that of Dror (2002; 2014; 2017), who stressed the necessity of fostering sustainability-oriented politicians. This inattention leads inevitably to the irreconcilable dilemma that more influential, effective institutionalization is less likely to be sustainable in democratic constitutions. In fact, drawing on case studies of institutions representing future generations in six countries and regions, Jones, O'Brien, and Ryan (2018; p.158) concluded, "Institutions which are given too much power, too early in their lifespan, tend to face rejection from politicians."

Thus, unlike earlier studies, this study seeks a form of institutionalization in which politicians elected in a conventional democratic manner are allowed voluntarily to represent future generations' voices (*future generations' voluntary representatives*). In doing so, this study aims to establish a model describing the psychological process in which individuals experience future generations' perspective through deliberation, and this experience in turn motivates those individuals to serve as *future generations' voluntary representatives*. This research objective includes development of scales for measuring psychological states during the deliberation process. Thus, the present study is expected to obtain a scientific basis on which to explore forms of institutionalizing future generations' representation through which individuals

can most effectively overcome presentism. Such exploration can be accomplished by maximizing expected values, as measured by these scales.

This study was inspired by the finding of Hara et al. (2019) that future generations' voluntary representatives can emerge through deliberations in a real setting in a specific environment. They observed this in a series of workshops in the Yahaba (Iwate Prefecture, Japan) municipal government (2015—2016), which organized the workshops to obtain input for developing a comprehensive, long-term strategy looking toward 2060. Some local citizens (approximately twenty) were invited to these workshops and allocated to what they called "imaginary future generation" groups and asked to play the future generation's role to create visions from the standpoint of those living in 2060. The concept "imaginary future generation" was developed by Saijo (2017; 2019) who proposed the framework of Future Design, a branch of future studies. Future Design assumes that individuals possess "futurability," an intrinsic instinct to care for future generations; Future Design seeks new social systems in which futurability is activated (unlike the system in which democracy and the market benefit the present generation more). In this deliberative setting, these groups of citizens expressed distinct policy opinions to realize a future world in which imaginary future citizens were immersed.

To summarize, the present study aims to establish a psychological model describing the process in which individuals get willing to serve as future generations' voluntary representatives. In spite of the common failure mentioned above to institutionally reflect future generations' voices in the current decision making, the present study implicitly assume the existence of such a psychological process. This assumption seems to be partly supported by the psychological literature demonstrating that perspective taking (i.e., a cognitive process in which individuals

adopt others' viewpoints in an attempt to understand their preferences, values, and needs [e.g., Parker & Axtel, 2001]) induce prosocial behaviors. While studies in this line consider taking perspectives of others in the same era, the present study explores the possibility that this theoretical framework can be extended

, this study succeeded in identifying a causal path by which individuals become willing to serve as future generations' voluntary representatives. This is regardless of their level of caring about future generations insofar as they have a sufficient disposition for critical thinking, suggesting that a disposition for critical thinking might serve as a criterion for judging who can fulfill roles as future generations' spokespersons and guardians.

2. Conceptual Framework and Hypotheses

The present study posits the following four hypotheses and aims to test them.

H1: There are two psychological constructs behind the procedure of experiencing future generations' perspective: one representing the psychological state achieved when individuals succeed in taking the future generation's perspective (construct *X*). The other represents the psychological state when individuals feel willing to serve as future generations' voluntary representatives after experiencing the perspective-taking intervention (construct *Y*).

H2: Construct *X* causes construct *Y*.

H3: A disposition for critical thinking is an antecedent of construct *X*.

H4: Generativity (i.e., concern for establishing and guiding the next generation) serves as an antecedent of construct *Y*

These hypotheses are detailed below. By extending the retrospective assessment studies of Anderson, Teisl, and Noblet (2012) and Noblet, Anderson, and Teisl (2015), Nakagawa, Kotani, Matsumoto et al. (2018) developed an intervention for motivating individuals to acquire preferences for policy options benefiting future generations. Their intervention was a package of two closely related components: (i) an exercise evaluating a past generation's decisions from the present generation's perspective, and (ii) evaluation of current policy options from a future generation's perspective. Furthermore, Nakagawa et al. (2019) developed a new package by adding (iii) watching a picture-story show prior to (ii) helping participants develop their own ideas on what taking a future generation's perspective is like. This study deepens previous studies by identifying psychological constructs underlying attitude changes induced by perspective taking, namely constructs *X* and *Y*, as referred to in hypothesis **H1**.

The study further hypothesizes causality between these two constructs (i.e., construct *X* causes construct *Y*: **H2**). While few earlier studies have considered the psychological process of taking the future generation's perspective, hypothesis **H2** is consistent with psychological literature on perspective taking (i.e., a cognitive process in which individuals adopt others' viewpoints in an attempt to understand their preferences, values, and needs [e.g., Parker & Axtel, 2001]), which has implicitly limited its scope to the perspective of others living in the same era.

In fact, earlier studies have consistently demonstrated that perspective-taking interventions increase prosocial behaviors (Batson et al., 2002; Condon et al., 2013; Ahn, Le, & Bailenson, 2013; van Loon et al., 2018) or enhances empathy (i.e., an emotional response to another's hardship; Davis, 1980) (Shechtman & Tanus, 2006; Bunn & Terpstra, 2009; Soble, Spanierman, & Liao, 2011), which is known to induce prosocial behaviors (Zaki & Mitchell, 2013; Hein et al., 2010). Hypothesis **H2** generalizes these studies.

Finally, we set two hypotheses on the dispositional antecedents of the two constructs referred to in the description of **H1**. We hypothesized that a disposition for critical thinking is an antecedent of construct *X* (hereafter called **H3**). Critical thinking is a form of open-minded consideration that aims to gain insight into how to improve things, with a focus on judgment and testing of acquired insight (Garrison, 1991; Nakagawa et al., 2015). Reasonably then, those with stronger disposition for critical thinking are more likely to adopt future generation's new perspective, insofar as they approve its usefulness after they review it critically and independently. This speculation aligns with Brookfield (1987), Maynard (1996), and Nakagawa, Kotani, Arai et al. (2018). We also hypothesized that generativity (i.e., concern for establishing and guiding the next generation [Erikson, 1950; McAdams & de St. Aubin, 1992]) serves as an antecedent of construct *Y* (hereafter called **H4**). Van Loon et al. (2018) argued that while individuals are relatively stable in their levels of empathy, situations also powerfully affect levels by triggering or inhibiting empathetic responses. Our hypothesis is that the former can be explained by generativity, insofar as the empathetic target is the future generation.

3. Materials and Method

Study data were collected in the deliberative experiment conducted by Nakagawa et al. (2019) even though the present study and Nakagawa et al. (2019) had distinct research objectives. In the experiment, 187 participants were presented with a list of four policy options on the financial sustainable issue created by Nakagawa, Kotani, Arai et al. (2018). Groups of four people deliberated on their most preferable options from the future generations' perspective of 30 years from now (i.e., 2049). Participants expressed their individual preferences only after resuming their present-generation identity. While Nakagawa et al. (2019) aimed to assess their intervention's (i.e., watching a picture-story show to share an individual's experience during perspective taking) influence on participants' success in taking the future generation's perspective in deliberations and their choices of policy options, this study aimed to understand the psychological process behind the intervention.

In this study, Figure 1 duplicates Nakagawa et al.'s (2019) experimental procedure. After all seven steps were completed, respondents filled in a questionnaire that included items on (i) age, (ii) gender, (iii) marital status, (iv) employment status, (v) educational background, (vi) critical thinking disposition, (vii) generativity, and (viii) original items on feelings during and after group discussion in taking the future generation's perspective.

With regard to (vi), our study adopts Hirayama and Kusumi's (2004) scale consisting of thirteen items for its logical thinking subscale and ten items for its inquisitiveness subscale. Each item was rated on a five-point scale, with theoretical ranges of 13–65 and 10–50, respectively. Originally, the items were in Japanese, but this study's authors translated them into English for a demonstrative purpose (see Table 1).

(Table 1 inserted about here.)

To measure (vii) generativity, the present study adopted the Generative Behavior Checklist (McAdams & Aubin 1992) with 40 items and 10 filler items and a theoretical range from 0 to 40.

The 24 items in (viii) are listed in Table 2. In the questionnaire, these items were presented to participants with the prefatory remark “Please answer to what extent the following items describe your experience of participating in the deliberation.” The items were rated from 1 = *Strongly disagree* to 5 = *Strongly agree*, and they were created based on results of in-depth interview surveys with two females who participated in a Japanese municipal government’s series of workshops with an imaginary future generation (see Hara et al. [2019] for workshops’ details). In the interviews, participants expressed their feelings either (I) by reflecting on themselves during group discussion of taking the future generation’s perspective or (II) by reflecting on themselves after resuming their present-generation identity. Item numbers 1 to 10, 12, and 15 to 17 corresponded to category I, and the rest (nos. 11, 13, 14, 18 to 24) corresponded to category II. Several items in category I related to feelings while groups struggled to acquire the future generation’s perspective (thus corresponding to construct *X*, **H3**), and several items in category II related to the current generation’s motivation to support the future generation (thus corresponding to construct *Y*, **H4**).

(Table 2 inserted about here.)

Factor analysis was applied to the twenty four items in (viii) to identify constructs underlying the psychological procedure of becoming sympathetic to the future generation by taking their perspective. This explorative analysis was followed by confirmatory factor analysis, in which causal relationships among identified constructs were assumed, and a structural

equation model was developed. Antecedent variables measured in (vi) and (vii) were also included in the model. Factor analysis is a statistical method to understand the mechanism behind the correlations among observable variables (e.g., the scores of the 24 items) by assuming a lower number of implicit variables called factors that linearly affect the observable variables (e.g., the two constructs to be identified in the present study). A major output of factor analysis is the knowledge on which observable variables are associated with which factors. This knowledge enables one to attach meanings to the identified factors. Structural equation modeling is a combination of factor analysis and multiple regression analysis. This technique not only identifies factors behind the correlated observable variables but also quantifies the associations among such factors. A major output of the structural equation modeling is the knowledge on whether each of the associations among the factors are statistically significant or not. The procedure for factor analysis and structural equation modeling is further detailed in the Results section.

4. Results

4.1 Exploratory Factor Analysis Result

Data were collected from 187 research participants, whose characteristics are summarized in Table 3. The average scores for the twenty four items were calculated, with all ranging from 0.5 to 4.5, suggesting that no ceiling/floor effects had emerged. Thus, factor analysis was applied to all these items using R-3.3.2 software and its package “nFactors.” As expected in hypothesis **H1**, when determining the number of factors, the technique of optimal

coordinates (e.g., Ruscio & Roche, 2012) and Horn's (1965) parallel analysis equally supported the two-factor structure. (In other words, when we assumed that there were two implicit variables behind the twenty four items, the observed correlation matrix of these items were reproduced the best.) Thus, factor analysis results assuming this structure were conducted, with ProMax rotation adopted. See Appendix for the details of the procedure. After deleting eight items among the twenty four, the factor analysis was conducted on the remaining sixteen items (see Table 4). It was interpreted that the second factor (nos. 2, 3, 4, 8, 9, 12, 13, 15, & 17) represented "Disengagement from the present," while the first factor (nos. 18, 19, 20, 21, 22, 23, & 24) represented "Supportive attitude toward future generations."

Table 5 summarizes correlation coefficients of the two factors with external variables. Specifically, as expected in hypothesis **H3**, the first factor "Disengagement from the present" correlated significantly with the logical thinking and inquisitiveness subscales of the critical thinking disposition: $r = 0.15$ ($p < 0.05$) and $r = 0.26$ ($p < 0.01$). Also, in accordance with hypothesis **H4**, the second factor "Supportive attitude toward future generations" correlated significantly with generativity: $r = 0.17$ ($p < 0.05$). These results suggest that the two developed scales had sufficient levels of criterion-related validity. The two factors' Cronbach's alpha coefficients were 0.81 and 0.82, respectively, suggesting that they also had sufficient levels of internal consistency.

Notably, the inquisitiveness subscale correlated not only with "Disengagement from the present" but also with "Supportive attitude toward future generations" ($r = 0.37$; $p < 0.01$). This unexpected result suggests that participants high in this score directed their inquisitiveness not only to the act of perspective taking but also to future generations per se.

(Tables 3, 4, and 5 inserted about here.)

4.2 Confirmatory Factor Analysis

In confirmatory factor analysis, structural equation modeling was applied to the data, in which the two factors' causality was assumed according to hypothesis **H2** (i.e., “Disengagement from the present” as the cause and “Supportive attitude toward future generations” as the consequence). R-3.3.2 software and its package “sem” were used. The result, summarized in Figure 1, suggested that the standardized path coefficient on the association between these two constructs was 0.70 ($p < 0.01$) and that the hypothesis was verified. The established model had an acceptable level of goodness of fit, although not very high (GFI¹ = 0.90, AGIF² = 0.87, RMSEA³ = 0.055). Note that these indexes represent the extent to which the observed correlation matrix (or the covariance matrix) among the observable variables are reproduced by the developed model. All paths in Figure 1 were found significant at the 5% level.

Figure 2 shows another structural equation modeling analysis, in which three antecedents of the two factors (i.e., the two subscales of critical thinking disposition and generativity) were included as observable variables. Following the finding in subsection 3.1, the inquisitiveness was assumed to influence both “Disengagement from the present” and “Supportive attitude towards future generations”. Again, consistent with hypotheses **H3** and **H4**, relationships among the two constructs (“Disengagement from the present” and “Supportive

¹ Goodness-of-fit statistic.

² Adjusted goodness-of-fit statistic.

³ Root mean square error of approximation.

attitude toward future generations”) and their antecedents were significant. Additionally, this model’s goodness of fit was acceptable (GFI = 0.90, AGFI = 0.86, RMSEA = 0.048). All paths in Figure 2 were found significant at the 5% level.

(Figures 1 and 2 inserted about here.)

5. Discussion

This study aimed to identify psychological constructs underlying the process of becoming a future generation’s voluntary representative and to develop psychometrically sound scales to measure those constructs, thereby developing a structural equation model of the process. There were three major findings.

First, consistent with hypothesis **H1**, a psychological construct labeled “Disengagement from the present” was identified as relating to the psychological state that emerges when individuals take the future generation’s perspective. Psychological studies usually consider perspective taking that targets others in the same era, so they are allowed to assume that the “accuracy” of doing so can be defined and measured (e.g., Gehlbach, 2004; Schiffman et al., 2004). However, studies of perspective taking targeting future generations (such as this one) cannot naïvely adopt the concept of accuracy because the target has not yet matured or does not yet exist (e.g., Solow, 1991; Thompson, 2010). This seems a hurdle that hampers research on future generations on the basis of a rigid scientific foundation. This study succeeded in overcoming the hurdle by proposing a promising alternative to the conventional concept of accuracy because the new concept satisfies the two conditions that accuracy also satisfies: (i) it

is measurable in a psychometrically sound manner, and (ii) it can predict prosocial attitudes toward the target (i.e., in this case, future generations). Fundamentally, no matter what future generation you imagine subjectively, you must disengage from yourself-in-the-present to represent a future generation.

Second, in addition to the construct “Disengagement from the present,” this study identified the construct “Supportive attitude toward future generations.” While these constructs are equally related to the act of taking the future generation’s perspective, correlational analysis revealed that the constructs are discrete. In fact, the logical thinking subscale of the critical thinking disposition was significantly associated with only “Disengagement from the present,” while the generative behavior checklist was significantly associated with only “Supportive attitude toward future generations.” These correlational analysis results were consistent with hypotheses **H3** and **H4**, respectively. Perhaps the former is associated with individuals’ cognitive competence for becoming accustomed to a new way of thinking, and the latter is associated with the same individuals’ emotional aspects. This argument seems to be isomorphic to the psychological argument (e.g., Longmire & Harrison, 2018; Galinsky, Maddux, Gilin, & White, 2008; Galinsky, Gilin, & Maddux, 2011; Gilin et al., 2013) on distinguishing between perspective taking and empathy toward others, the two considered overlapping but still distinct.

Third, in spite of these constructs’ conceptual distinction, strong correlation between them (and possibly strong causation) was identified, consistent with hypothesis **H2**. This finding suggests that once individuals disengage from the present and take the future generation’s perspective, they are more likely to be empathetic to future generations. While this association is consistent with psychological literature linking the perspective taking and empathy cited

above (and thus not surprising), a different explanation might also be possible. This study differs from conventional perspective-taking literature in that its object (i.e., a future generation) depends totally on this act's subject (i.e., the present generation) but not vice versa. Therefore, once individuals take the future generation's perspective, they are positioned to wish the present generation had acted for the future generation's benefit. Even after the perspective-taking intervention is complete and they resume their present-generation identity, they retain the memory of sending wishes from the self-as-future-generation to the self-as-present-generation. This may well cause inconsistency within the self and cognitive dissonance (Festinger, 1957). One promising strategy to avoid such dissonance is to modify their attitudes toward future generations in a prosocial manner. This explains how individuals are motivated to serve voluntarily as the future generation's representatives after the perspective-taking intervention. The explanation seems consistent with those of social psychologists who have tested various ways of using cognitive dissonance theory as a tool of social influence, to modify individuals' behaviors, for example, energy conservation (Winette & Nietzel, 1975), water use during a drought (Dickerson, Thibodeau, Aronson, & Miller, 1992), safer sex among college students (Stone, Aronson, Crain, Winslow, & Fried, 1994), and recycling (Fried & Aronson, 1995), as summarized by Bator and Cialdini (2006).

These findings have two important practical implications for institutionalizing representation of future generations' voices. First, institutions representing future generations are likely to encounter rejection from politicians if the institutions receive too much power (Jones, O'Brien, and Ryan, 2018). Such failure seems likely because institutionalization does not include the mechanism by which politicians who oppose such institutionalization change

their attitudes toward future generations. The study's findings suggest that institutional design embedding perspective-taking intervention into parliaments' deliberative processes might resolve the problem. Furthermore, to expect that individuals not caring very much for future generations can also accept such institutionalization is not too optimistic; they can become future generations' voluntary representatives because the study has verified that whether an individual can take a future generation's perspective does *not* depend on empathy toward the future generation (as measured by generativity), but on cognitive competence (as measured by critical thinking).

Thus, the study suggests a new answer to the question of "How one can find adequate or suitable candidates that can fill the role as spokespersons and guardians of posterity in the legislative assembly?" (Ekeli, 2005; p. 436). By demonstrating that environmentalists represent only one strand among many different ways of problem formulation, Beckerman and Pasek (2001) argue against the naïve idea that environmentalists (e.g., environmental organizations and sustainability lobbies) should be such candidates. Ekeli (2005) continues this line of discussion by opposing the same idea: "One should not give one particular group or movement the privileged status of representative for future generations." Ironically, it seems that the same criticism can be applied to Ekeli's idea (2005) that the right to represent future generations "should be open to anyone who cares for the well-being of posterity" (ibid., p. 437) because it is not open enough to include those who care less about future generations. The study demonstrates that anyone elected by the conventional democratic process must be allowed to do so, insofar as s/he is willing to represent future generations. Those with higher levels of cognitive competence are likely to be such voluntary representatives.

Second, the present study successfully developed a scale to measure the extent to which individuals succeeded in disengaging from the present-generation self. Insofar as its strong relationship with a supportive attitude toward future generations is guaranteed, all we have to do is design institutions so that this scale's expected score is maximized, while the present generation's representatives can accept it. This method of designing institutions should be much more efficient than testing alternatives and modifying them only after they are found *ineffective* in influencing political decisions.

This study has an important limitation based on data collected in a laboratory experiment rather than in a real setting, even though the experiment involved a real issue. Importantly, future studies should implement the perspective-taking intervention in a real-world setting and confirm that the psychological model developed here can indeed be generalized to such a setting.

Appendix. The Procedure of Confirmatory Factor Analysis

The following four steps were followed in the explanatory factor analysis in subsection section 4.1.

Step 1: The result (not shown here to avoid redundancy) suggested that four of the twenty four items (nos. 1, 5, 10, and 16) had factor loadings lower than 0.35 for both factors.

Step 2: Thus, in the second-round analysis, these four items were deleted, and factor analysis was applied to the remaining twenty items, with two-factor structure again assumed. Two items comprising the second factor (nos. 6 and 7) had relatively low factor loadings, less

than 0.40 (0.37 and 0.36, respectively). Furthermore, item no. 14 had high factor loadings for both factors (0.52 and 0.52).

Step 3: Thus, in the third-round analysis, these three items were deleted, and factor analysis was applied to the remaining 17 items, assuming the two-factor structure. One item comprising the second factor (no. 11) had a relatively low factor loading, less than 0.40 (i.e., 0.38).

Step 4: After deleting this item, the final-round factor analysis was conducted on the remaining 16 items (see Table 4). It was interpreted that the second factor (nos. 2, 3, 4, 8, 9, 12, 13, 15, & 17) represented “Disengagement from the present,” while the first factor (nos. 18, 19, 20, 21, 22, 23, & 24) represented “Supportive attitude toward future generations.”

References

- Adachi, Y. (2019). How is it possible for democracies to effectively tackle long-term problems? *Journal of Comparative Policy Analysis*, 21(1), 116—129.
- Ahn, S. J., Le, A. M. T., & Bailenson, J. N. (2013). The effect of embodied experiences on self-other merging, attitude, and helping behavior. *Media Psychology*, 16, 7–38.
- Anderson, M.W., Teisl, M., Noblet C. (2012). Giving voice to the future in sustainability: Retrospective assessment to learn prospective stakeholder engagement. *Ecological Economics*, 84, 1—6.

- Batson, C.D., Chang, J., Orr, R., Rowland, J. (2002). Empathy, Attitudes, and Action: Can Feeling for a Member of a Stigmatized Group Motivate One to Help the Group? *Personality and Social Psychology Bulletin*, 28(12), 1656–1666.
- Beckerman, W. and J. Pasek, *Justice, Posterity, and the Environment* (Oxford University Press.)
- Brookfield, S. (1987). *Developing critical thinking: Challenging adults to explore alternative ways of thinking and acting*. San Francisco: Jossey–Bass.
- Buchanan, J. M. and Wagner, R. E., 1977, *Democracy in Deficit: the Political Legacy of Lord Keynes* (New York, NY: Academic Press).
- Bunn W, Terpstra J. (2009). Cultivating empathy for the mentally ill using simulated auditory hallucinations. *Academic Psychiatry*, 33(6), 457–460.
- Condon P, Desbordes G, Miller WB, DeSteno D. (2013). Meditation increases compassionate responses to suffering. *Psychological Science*, 24(10), 2125–2127.
- Davis, M.H. (1980). A multidimensional approach to individual differences in empathy. *Catalog of Selected Documents in Psychology*, 10.
- Dobson, A. (1996). Representative democracy and the environment, in William, M. and Macdowcroft, J. (eds), *Democracy and the Environment*, Edward Elgar Publishing.
- Dror, Y., 2002, *Capacity to Govern: A Report to the Club of Rome* (London, UK: Routledge).
- Dror, Y., 2014, *Avant-Garde Politicians: leaders for a New Epoch* (Washington, DC: Westphalia Press).

- Dror, Y., 2017, *For Rulers: priming Political Leaders for Saving Humanity from Itself* (Washington, DC: Westphalia Press).
- Erikson, E. H. (1950). *Childhood and society*. New York: Norton.
- Galinsky, A. D., Gilin, D., & Maddux, W. W. (2011). Using both your head and your heart: The role of perspective taking and empathy in resolving social conflict. In J. P. Forgas, A. W. Kruglanski, & K. D. Williams (Eds.), *The psychology of social conflict and aggression* (pp. 103–118). London, UK: Psychology Press.
- Galinsky, A. D., Maddux, W. W., Gilin, D., & White, J. B. (2008). Why it pays to get inside the head of your opponent: The differential effects of perspective taking and empathy in negotiations. *Psychological Science*, 19, 378–384.
- Gehlbach, H. (2004). A new perspective on perspective taking: A multidimensional approach to conceptualizing an aptitude. *Educational Psychology Review*, 16 (3), 207—233.
- Gilin, D., Maddux, W. W., Carpenter, J., & Galinsky, A. D. (2013). When to use your head and when to use your heart: The differential value of perspective-taking versus empathy in competitive interactions. *Personality and Social Psychology Bulletin*, 39, 3–16.
- Hara, K., Yoshioka, R., Kuroda, M., Saijo, T. (2019). Reconciling intergenerational conflicts with imaginary future generations: evidence from a participatory deliberation practice in a municipality in Japan. *Sustainability Science*. (In press.)
- Jensen, K.K. (2015). Future generations in democracy: Representation or consideration? *Jurisprudence: An International Journal of Legal and Political Thought*, 6(3), 535—548.

- Jones, N., O'Brien, M., & Ryan, T. (2018). Representation of future generations in United Kingdom policy-making. *Futures*, 102, 153—163.
- Kavka, G., Warren, V. (1983). Political representation of future generations, in Elliott, R. and Gare, A. (eds), *Environmental Philosophy: A Collection of Readings*, Pennsylvania State University Press.
- Longmire, N. H., and D. A. Harrison. 2018. Seeing their side versus feeling their pain: Differential consequences of perspective-taking and empathy at work. *Journal of Applied Psychology* 103(8): 894–915.
- Low, N. and Gleeson, B., 1998, *Justice, Society and Nature* (London, UK: Routledge).
- Mank, B., 1996, Protecting the environment for future generations: A proposal for a republican superagency. *NYU Environmental Law Journal*, 5(2), p. 444.
- Maynard, C.A. (1996) Relationship of critical thinking ability to professional nursing competence. *Journal of Nursing Education* 35(1), 12–18.
- McAdams, D. P., & de St. Aubin, E. (1992). A theory of generativity and its assessment through self-report, behavioral acts, and narrative themes in autobiography. *Journal of Personality and Social Psychology*, 62, 1003–1015.
- Nakagawa, Y., Arai, R., Kotani, K., Nagano, M. Saijo, T. (2019). Visual narrative for taking future generation's perspective. Unpublished manuscript. (Under review in *Sustainability Science*.)

- Nakagawa, Y., Kotani, K., Arai, R., Nagano, M., Saijo, T. (2018). Intergenerational Retrospective Viewpoint and Financial Sustainability. Unpublished manuscript. (In Revision; Ref = FUTURES_2018_296_R2)
- Nakagawa, Y., Kotani, K., Matsumoto, M., Saijo, T. (2018). Intergenerational retrospective viewpoints and individual policy preferences for future: A deliberative experiment for forest management. *Futures*, 105, 40—53.
- Noblet, C.L., Anderson, M., Teisl, M.F. (2015). Thinking past and thinking future: an empirical test of the effects of retrospective assessment on future preferences. *Ecological Economics*, 114, 180–187.
- Parker, S.K., Axtell, C.M. (2001). Seeing another viewpoint: Antecedents and outcomes of employee perspective taking. *Academy of Management Journal*, 44, 1085—1100.
- Ruscio, J., & Roche, B. (2012). Determining the number of factors to retain in an exploratory factor analysis using comparison data of a known factorial structure. *Psychological Assessment*, 24(2), 282-292.
- Saijo, T. (2017). Future design. *Economic Review* 68(1), 33–45 (In Japanese).
- Saijo, T. (2019). Future design. In: Moulin H (ed) *Future of Economic Design*. Springer, Berlin.
- Schiffman, J., Lam, C., Jiwatram, T., Ekstrom, M., Sorensen, H., Mednick, S. (2004). Perspective-taking deficits in people with schizophrenia spectrum disorders: a prospective investigation. *Psychological Medicine*, 34, 1581—1586.

- Shechtman Z, Tanus H. (2006). Counseling Groups for Arab Adolescents in an Intergroup Conflict in Israel: Report of an Outcome Study. *Peace and Conflict*, 12(2), 119–137.
- Soble JR, Spanierman LB, Liao HY. Effects of a brief video intervention on White university students' racial attitudes. *Journal of Counseling Psychology*, 58(1), 151–157.
- Solow, R. M. (1991). Sustainability: an economist's perspective. J. Seward Johnson Lecture, Woods Hole Oceanographic Institution.
- Thompson, D.F. (2010). Representing future generations: Political presentism and democratic trusteeship. *Critical Review of International and Political Philosophy*, 13(1), 17—37.
- van Loon, A., Bailenson, J., Zaki, J., Bostick, J., Willer, R. (2018). Virtual reality perspective-taking increases cognitive empathy for specific others. *PloS One* 13(8), e0202442.
- Weiss, E. B., 1992, In fairness to future generations and sustainable development. *American University International Law*, 8(1), 19–26.

Figure 1: Experimental Procedure (Nakagawa et al., 2019)

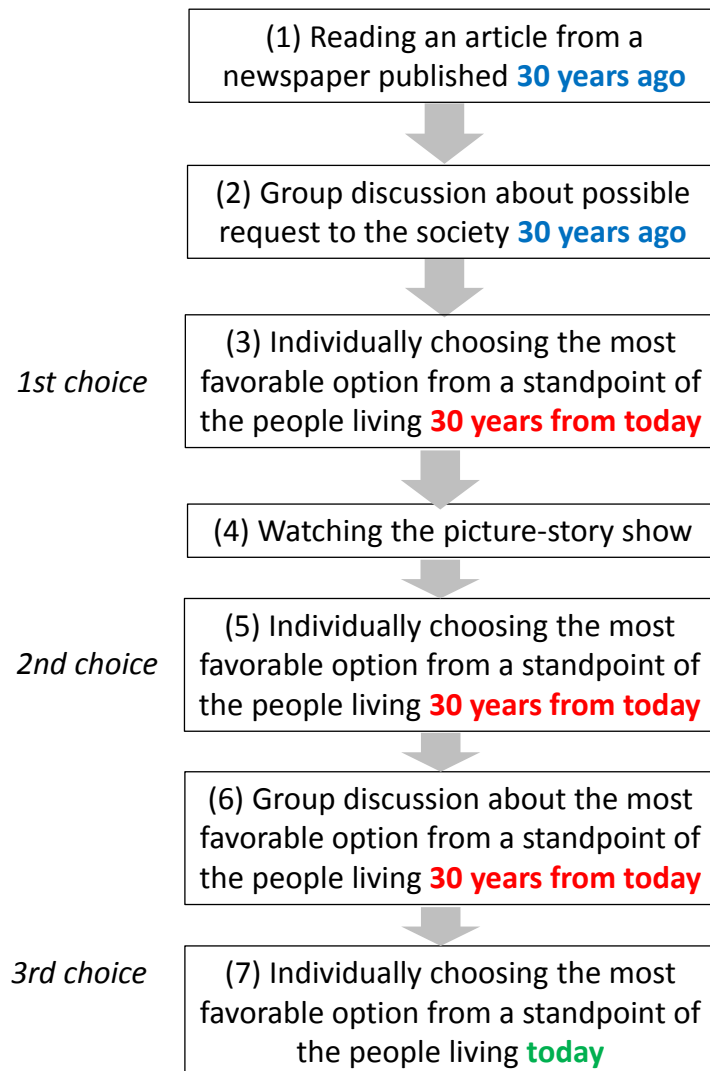
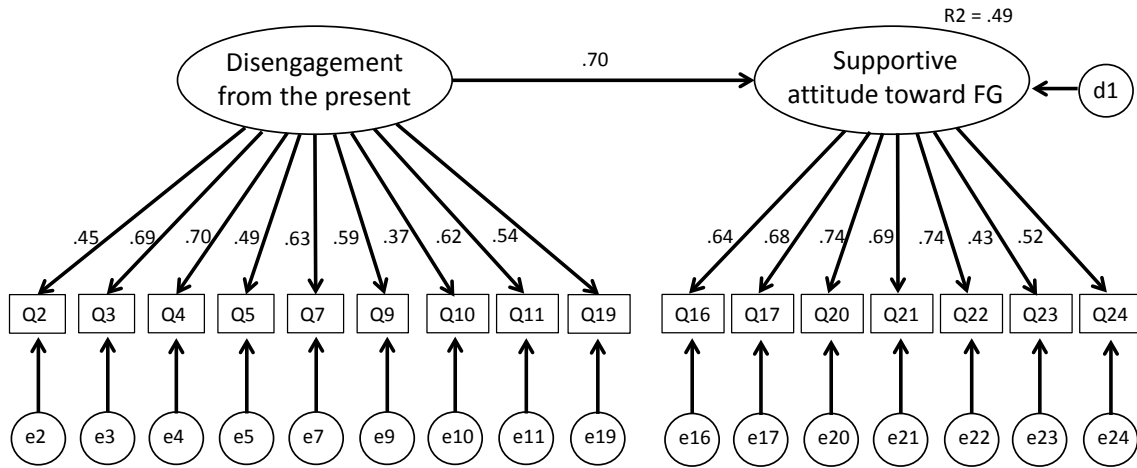


Figure 2: Structural Equation Modeling Result (The standardized solutions are shown.)

Variable *d1* is an independent latent variable. Variables *e2* to *e24* are error variables.)

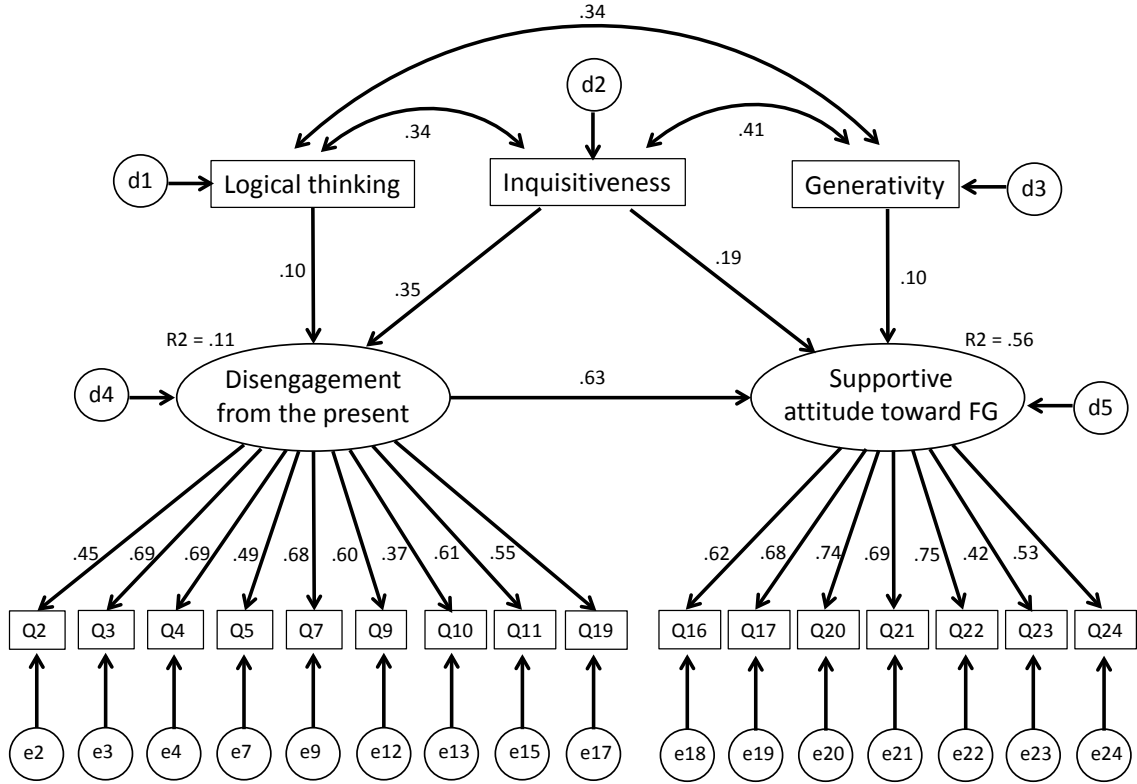


R2 of the 16 endogenous variables were as follows:

Q2	Q3	Q4	Q5	Q7	Q9	Q10	Q11	Q19	Q16	Q17	Q20	Q21	Q22	Q23	Q24
0.20	0.48	0.49	0.24	0.39	0.35	0.14	0.38	0.30	0.41	0.46	0.54	0.48	0.54	0.19	0.27

Figure 3: Structural Equation Modeling Result (The standardized solutions are shown.)

Variables d1 to d5 are independent latent variables. Variables e2 to e24 are error variables.)



R2 of the 16 endogenous variables were as follows:

Q2	Q3	Q4	Q5	Q7	Q9	Q10	Q11	Q19	Q16	Q17	Q20	Q21	Q22	Q23	Q24
0.20	0.48	0.48	0.24	0.40	0.40	0.14	0.38	0.30	0.39	0.47	0.54	0.47	0.56	0.18	0.29

Table 1: Critical Thinking Disposition Items (Hirayama & Kusumi, 2004)

A. Logical thinking subscale

- A1 I am good at thinking about complex problems in an orderly fashion
 - A2 I am good at collecting my thoughts
 - A3 I am confident in thinking about things precisely
 - A4 I am good at making persuasive arguments
 - A5 I am confused when thinking about complex problems
 - A6 I am the one to make decisions because my peers believe I can make fair judgments
 - A7 I can concentrate on grappling with problems
 - A8 I can continue working on a difficult problem which is not straight forward
 - A9 I can think about things coherently
 - A10 My shortcoming is that I am easily distracted*
 - A11 When I think about a solution, I cannot afford to think about other alternatives*
 - A12 I can inquire into things carefully
 - A13 I am constructive in proposing alternatives
-

B. Inquisitiveness subscale

- B1 I want to interact with people with various ways of thinking and learn a lot from them
 - B2 I want to keep learning new things throughout my life
 - B3 I like to challenge new things
 - B4 I want to learn about various cultures
 - B5 I believe it is meaningful to learn foreigners' ways of thinking
 - B6 I am interested in people who have different ways of thinking
 - B7 I want to gain deeper knowledge regarding any issues
 - B8 I want to learn things as much as possible even if the usefulness is unclear
 - B9 I enjoy discussing with people with different opinions
 - B10 I tend to ask questions when I have something unclear to me
-

Note. *: Reversed item. Items were rated from 1 = "Strongly disagree" to 5 = "Strongly agree".

Table 2: The List of 24 Items

No	Item	<i>M</i>	<i>SD</i>
Q1	I felt it was a highly intellectual task to disengage from the present-generation self and to take the future generation's perspective.	4.0	0.8
Q2	I actually felt what it was like to be a future person.	3.7	0.9
Q3	I concentrated on discussions, putting aside my daily complaints and worries.	3.5	1.0
Q4	I felt gradually as if I were living in a future world that I was articulating.	3.0	0.9
Q5	I recognized which group members were or were not acting as future people.	2.9	0.9
Q6	While experiencing the future-generation role, I learned that issues serious for the present generation are sometimes irrelevant for the future generation.	3.8	0.8
Q7	I felt as if I, as the person living in 2019,* were another person.	2.4	0.9
Q8	I felt as if the year 2019* were in the past.	3.1	1.0
Q9	I felt that the future world, from the future generation's perspective, differs essentially from that of the present generation's perspective.	3.3	0.9
Q10	I think that a future world imagined from a future generation's perspective would not receive a fair evaluation from the present generation.	3.0	0.9
Q11	After experiencing a future-generation role, I might find that my wavelength differs from that of the present generation who have not had such an experience.	3.1	1.0
Q12	While playing the future-generation role, I found that a long-term project, which the present generation would think stupendous, seemed very realistic to me.	3.7	0.8
Q13	After experiencing the future-generation role, I feel that I have grown.	2.6	1.0
Q14	After experiencing the future-generation role, I feel my mind has broadened.	3.7	0.8
Q15	To others, I expressed ideas that I would have hesitated to express in the normal environment.	3.4	0.9
Q16	I heard positively others' opinions that I would have denied in the normal environment.	3.8	0.9
Q17	I was so brave as to express more daring opinions than I usually do.	3.5	0.9
Q18	After experiencing the future-generation role, I feel I am competent, from a new perspective, to evaluate what the government is doing in 2019.*	3.5	0.8
Q19	After experiencing the future-generation role, I think I will utilize this perspective in my daily life.	3.8	0.8
Q20	After experiencing the future-generation role and coming back to the present, I would like to contribute to realizing the vision I created as the future generation.	3.9	0.7
Q21	After experiencing the future-generation role, I have stronger motivation to do things in a way that will make the future generation grateful to me.	3.6	1.0
Q22	I hope present-generation people will experience the role of the future generation as I did.	3.9	0.8
Q23	After experiencing the future-generation role, I am more sympathetic to the future generation than before.	3.1	1.0
Q24	After experiencing the future-generation role, I feel more strongly than before that the future generation should be cherished as the present generation is.	3.9	0.8

Notes. *: The year 2019 should be replaced with the year in which this questionnaire is implemented.

Table 3: Characteristics of the Sample

	<i>n</i>	%	<i>M</i>	<i>SD</i>	Cronbach's alpha
Age					
≤29	17	9.1			
30-39	19	10.2			
40-49	49	26.3			
50-59	64	34.4			
60-69	31	16.7			
≥60	6	3.2			
Gender					
Male	46	24.7			
Female	140	75.3			
Marital Status					
Yes	128	68.8			
No	58	31.2			
Employment Status					
Permanent Job	105	56.5			
Other	81	43.5			
Education					
Univ. Graduate or above	82	44.1			
Other	104	55.9			
Critical Thinkig Disposition					
Logical Thinking Subscale			40.7	7.4	0.88
Curiosity Subscale			39.8	6.0	0.91
Generativity					
			26.1	12.0	0.87

Table 4: Factor Analysis Result

No	Item	Factor 1	Factor 2
Q2	I actually felt what it was like to be a future person.	0.23	0.67
Q3	I concentrated on discussions, putting aside my daily complaints and worries.	0.08	0.52
Q4	I felt gradually as if I were living in a future world that I was articulating.	0.34	0.60
Q8	I felt as if the year 2019 were in the past.	0.16	0.43
Q9	I felt that the future world, from the future generation's perspective, differs essentially from that of the present generation's perspective.	0.02	0.42
Q12	While playing the future-generation role, I found that a long-term project, which the present generation would think stupendous, seemed very realistic to me.	0.25	0.48
Q13	After experiencing the future-generation role, I feel that I have grown.	0.27	0.55
Q15	To others, I expressed ideas that I would have hesitated to express in the normal	0.28	0.55
Q17	I was so brave as to express more daring opinions than I usually do.	0.25	0.53
Q18	After experiencing the future-generation role, I feel I am competent, from a new perspective, to evaluate what the government is doing in 2019.	0.54	0.31
Q19	After experiencing the future-generation role, I think I will utilize this perspective in my daily	0.59	0.30
Q20	After experiencing the future-generation role and coming back to the present, I would like to contribute to realizing the vision I created as the future generation.	0.76	0.15
Q21	After experiencing the future-generation role, I have stronger motivation to do things in a way that will make the future generation grateful to me.	0.42	0.13
Q22	I hope present-generation people will experience the role of the future generation as I did.	0.63	0.35
Q23	After experiencing the future-generation role, I am more sympathetic to the future generation than before.	0.68	0.22
Q24	After experiencing the future-generation role, I feel more strongly than before that the future generation should be cherished as the present generation is.	0.54	0.10
SS Loadings		3.03	2.94
Proportion of Variance		0.19	0.18
Cumulative Variance		0.19	0.37

Table 5: Criterion-Related Validity of the Developed Scales

	Disengagement form the Present	Suportive Attitude toward FG¹
Critical Thinking Disposition		
Logical Thinking Subscale	0.15 *	0.09
Inquisitiveness Subscale	0.26 **	0.37 **
Generativity	0.00	0.17 *

Notes. 1: FG = Future generations. *: $p < 0.05$. **: $p < 0.01$.