



Title	Social Dilemma as a Device for Recognition of a Shared Goal : Development of “ Consensus Building of Wind Farm Game ”
Author(s)	OHNUMA, Susumu; KITAKAJI, Yoko
Citation	ISAGA/JASAG2015 the 46th ISAGA conference Japan Association of Simulation & Gaming hosts 17–21 July 2015 Kyoto, Japan, 475-490
Issue Date	2015-06
Doc URL	http://hdl.handle.net/2115/62393
Type	proceedings (author version)
Note	ISAGA/JASAG2015 the 46th ISAGA conference Japan Association of Simulation & Gaming hosts 17–21 July 2015 Kyoto, Japan
File Information	ISAGA2015ohnuma4.pdf



[Instructions for use](#)

Social Dilemma as a Device for Recognition of a Shared Goal: Development of “Consensus Building of Wind Farm Game”

Susumu OHNUMA¹, Yoko KITAKAJI²

Abstract This study explores the processes required to achieve consensus on controversial issues that involve social dilemmas and developed the “Consensus Building of Wind Farm Game” (WinG). A social dilemma is a conflict between personal profit and public benefits wherein the results of individuals pursuing their own profit means that public benefits decline; thus, ultimately, individuals lose their profit. Shared recognition of a common goal is crucial in resolving social dilemmas; however, in actual practice, developing such a shared recognition is difficult due to conflicts among stakeholders. To help identify effective resolutions to this problem, we examined a case of planning for a wind farm, which often involves controversy, even though many people generally agree to the plan. WinG was developed to simulate the type of conflicts among stakeholders when planning a wind farm. There are five types of players (stakeholders) in WinG and each has a different goal and is provided with different information. All the players are required to maximize their individual goals within the time limit, however at the same time, from the viewpoint of public benefit, an optimal achievement point is hidden in the game that results in the second best outcome for all the players. Through negotiations, bargaining, and debate, the social dynamics of achieving (or failing to achieve) a consensus were observed in WinG. Analysis from 10 games showed that shared recognition of a common goal was related to consensus, while only information sharing was not sufficient.

Keywords: consensus building, social dilemma, shared recognition of common goal, wind power plant, stakeholder conflicts

¹ Ohnuma, S., Hokkaido University, Sapporo, Japan, ohnuma@let.hokudai.ac.jp

² Kitakaji, Y., Hokkaido University, Japan Society for the Promotion of Science, Sapporo, Japan, ykitakaji@lynx.let.hokudai.ac.jp

1 Research Interest

The ultimate goal of this study is to figure out a process to build a consensus beyond conflicts of interest. Many previous studies have dealt in attempting to resolve social dilemmas. However, this study proposed that making the primary issue a social dilemma can be a key to resolving a conflict, particularly when the interests of active parties glaringly contradict.

This study dealt with a case of planning a wind power plant. Although many people generally approve of siting wind power facilities, controversies often arise during the creation of a concrete plan. It is essential to understand social dynamics of stakeholder interactions to find a way to build consensus in such a controversial situation. Therefore, this study developed a gaming namely “Consensus Building of Wind Farm Game” (WinG), which attempted to simulate a process of arousing conflict and building consensus beyond the diverse interests of stakeholders.

1.1 Making the issue a social dilemma

A social dilemma is a conflict between personal profit and public benefit, wherein the results of individuals pursuing their own profit means that public benefit declines; thus, ultimately, every individual loses their profit (Dawes, 1975, 1980; Marwell & Schmitt, 1992; Messick & Brewer, 1983). Numerous studies have focused on how to prevent “the tragedy of the commons,” which inevitably occurs if no preventative measures or interventions are undertaken (Hardin, 1968).

One of the major theories guiding mutual cooperation in social dilemmas is goal expectation theory (Pruitt & Kimmel, 1977; Yamagishi, 1986, 1988), which consists of two steps: (1) individuals recognize the importance of group or societal benefit and becomes to aim for mutual cooperation and (2) the individuals can believe that others also realize the importance of common benefit and mutual cooperation, hence they can have expectation that others will cooperate if they witness cooperation. Therefore, the research question in most social dilemma studies has been how can people have an expectation of mutual cooperation.

In reality, however, it is uncertain whether the surrounding issue is a social dilemma. Even conceding that it includes a structure of social dilemma, many confounding factors and structures such as conflicting interests of parties usually involves. In such a complex situation, a subjective definition of the issue influences people’s reactions and shapes a social representation (Abric, 1982). If people believe that a situation is a zero-sum game, in which the expected consequence is only win or lose, it will become difficult to reach a compromise. On the other hand, if people believe that a situation is a social dilemma, they will seek a common goal desirable for everyone, and thus be able to reach a compromise (Doba, 2008; Ohnuma, 2011). For instance, Ohnuma (2009) found from a case study of

implementing a charge system for household waste that it was hard to engage in a constructive discussion when focusing only on the charge system, but was successful when focusing on public benefit, such as how to direct a circulative society and how to reduce waste and inappropriate disposal. By focusing on public benefit, people began to consider and discuss what can be done and what type of rules should be implemented for directing the common goal beyond the controversy over the charge system. Throughout the discussion of a participatory program, citizens began to share a concrete image of a common goal. This was a successful case of consensus building through clarifying shared recognition of the common goal by turning the issue from controversy to a social dilemma. Therefore, shaping a shared recognition of common goal posing the issue as a social dilemma is crucial, particularly when stakeholders hold conflicting interests. It will be a significant step for consensus building beyond controversy when stakeholders realize the situation as a social dilemma and begin to consider a common goal developing shared recognition.

Prior to developing a shared recognition, however, how to share relevant information should be considered. It is impossible to foster shared recognition without sharing pertinent information. Needless to say, the information should be accurate and reliable; however, a mere provision of accurate information does not aid in shaping shared recognition. The process of information sharing, rather than providing information, is important for understanding both common and differing interests of stakeholders, whereas information sometimes accentuates controversy, especially when interests and values are contradictory. Stakeholders interpret the information in different ways, even though the information is objectively the same. In such a controversial situation, it will get harder to turn their attention to what is desirable for all parties involved. Eventually, only providing information without developing shared recognition of a common goal will fail to reach a consensus.

Therefore, designing the discussion setting is crucial for consensus building, that is, how to adjust the focus of the discussion frame from a zero-sum situation to a social dilemma. Based on the research perspective above, we developed a gaming to observe the process of consensus building when interests of stakeholders are contradictory.

1.2 Issues concerning the siting of wind power plants

Wind power generation seems to be accepted by many people. Indeed, wind is the most widespread renewable energy in the world, and the amount of electricity generated by wind power is rapidly increasing across the EU, U.S., China, and India (Global Wind Energy Council, 2013). In Japan, approximately 80% of residents approved of wind power plants even when they are erected in a controversial site (Sato & Ohnuma, 2013).

Nevertheless, plans for siting wind power plants sometimes hit a snag or are stopped due to opposition. The main reasons for opposition are bird strikes (wherein birds, particularly those of prey such as white-tailed eagles accidentally collide with wings of wind power plants), concern for health hazards of low-frequency waves and noise, and destruction of the landscape. Japan's Ministry of the Environment stressed these three issues in the guideline on environmental assessment of siting a wind power facility (Ministry of the Environment, 2013).

There are those who want to promote and those who wish to oppose wind power plants in the name of preserving the environment, resulting in contrasting perspectives. Those who seek to promote wind farms emphasize the global view of mitigating climate change and depletion of fossil fuels. In contrast, those who oppose their construction emphasize local views such as preservation of local ecology and wildlife. Local views are usually persuasive because local matters are highly visible and it is easy to perceive their reality compared to global views. Additionally, the global view does not help persuade people as to why the site is appropriate, even though the general perspective is approved. Accordingly, local matters become the central issues, making it relatively difficult to focus on a common goal that is emphasized in the global view.

This study adopted the issue of consensus building for wind power plants and implemented stakeholder conflicts and a social dilemma aspect in the development of a game.

2 Design of the “Consensus Building of WinG”

2.1 Rules and proceedings of the WinG

WinG is a role-playing game that involves face-to-face communication. Players are asked to become the character of the role and instructed to maximize their own goal adding the note that they will receive goods or snacks according to the level of achievement of their own goal.

2.1.1 Setting of the scene

Players are going to participate in a meeting of City A regarding whether they should construct or not construct wind power plants at a candidate site. The candidate site is in very good condition for constructing wind power plants; for example, stable winds blow throughout the year in the area, so a reliable supply of electricity generation is expected. City A made an initial plan to construct 15 wind power plants along its coast. Participants have to decide whether to construct or

not to construct the power plant at each of the 15 spots. They are not allowed to postpone the decision.

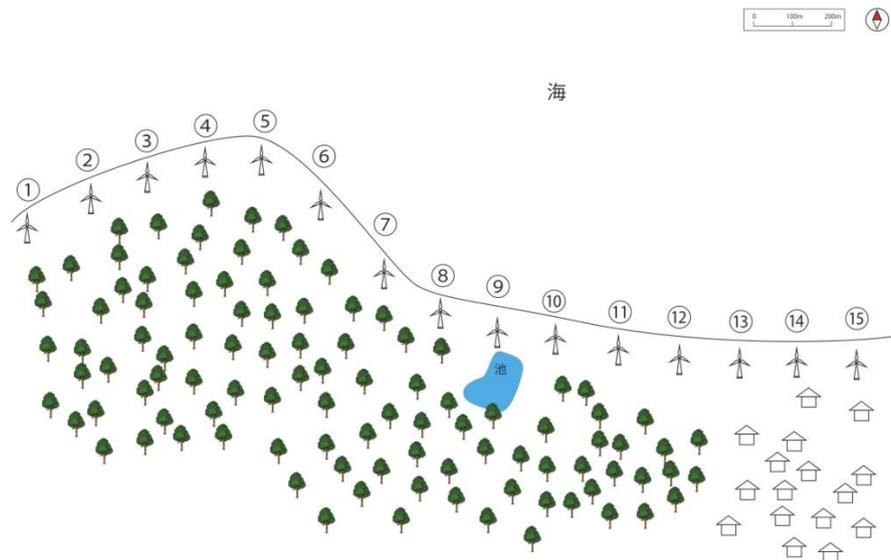


Figure 1 Map of the candidate site for wind power plants in City A

2.1.2 Types and roles of the players

There are five roles in WinG: wind power company, non-profit organization (NPO) promoting wind power, administrative staff of City A, wildlife preservation group, and residents of the opposition movement. The stances and individual goals of these roles are shown in Table 1. There are three stakes for promoting and two for opposing. However, the administrative staff has to take the chair, and put priority to eliminate any undecided spots.

Table 1 Stances and individual goals according to the five roles

Role	Stance regarding the plan	Individual goal
Wind power company	Promote	Anticipating bigger profit
NPO promoting wind power	Promote	Spreading renewable energy, particularly wind power
Administrative staff	Neutral ~promote	Smooth consensus building/ increasing tax revenue
Wildlife preservation group	Oppose	Preservation of wildlife and local ecology
Residents of the opposition movement	Oppose	Preventing potential risk of health hazards by low-frequency waves and noise

Participants are asked to become the role completely and try to achieve their own goal even if it is different from their personal attitude and values. Roles are decided by drawing lots because many participants tended to have a positive attitude towards wind power plants (see section 1.2) so that it is difficult to decide the role, according to participants' pre-attitude. Therefore, it is emphasized that this is a roleplaying game irrelevant to personal attitude.

2.1.3 Pre-held information for each role

After deciding on a role, each player read two documents. One is about their own goal, for which achievement is rated on 4-grade scales: ⊙, ○, △, ×. For example, if the company succeeds in constructing eight or more wind power plants, he/she will get ⊙. If a resident of the opposition movement succeeds in preventing the construction of five or more wind power plants near his/her residential area, he/she will get ⊙. As for Administrative staff, he/she has to adjust the balance between own profit and promoting consensus, that is, he/she can get ⊙ only when constructing eight or more wind power plant and there is no undecided spots. However administrative staff can get ○ when there is no undecided spot and get × when there are two or more undecided spots regardless of the number of constructing wind power plants, which means that administrative staff is motivated to make consensus rather than increase the number of constructing wind power plant. Players are required not to reveal their own goal to the other types of players. Players can know only their own goal and cannot know the other players' goal in the beginning. This means that participants could not understand the whole structure of the game and never know whether it is a social dilemma or not until the game finished. The reason of this is that the focus of this game is to describe a process of changing participants' cognition, particularly how and when they regard the situation as non-zero-sum and what cue cause them change their cognition.

The second document is about information specific to each role. For example, information about environmental impact assessment and cost of construction for the player representing the company, areas where rare species of birds are inhabiting for the wildlife preservation group, potential risks of health hazards for residents of the opposition movement, and global levels of climate change and resource depletion for the person representing the NPO. The players can choose whether disclose or not to disclose this information to the other players.

The information provided is sometimes incongruent across the roles; for example, eyewitness to a white-tailed eagle is broader for the wildlife preservation role and is narrower in the environmental impact assessment of the person representing the company. Similarly, the company is provided with scientific evidence and legal standards regarding health hazard risks while the resident of the opposition movement is provided with the voice of victims of such hazard risks. Such incon-

gruity of information is assumed to make the conflict more complicated even though information is disclosed.

Players are not allowed to interact with the other players while reading the documents.

2.1.4 Starting the game and proceeding actions

After all players finish reading the documents, they gather around the table and start the discussion. The administrative staff takes the chair. Players have to decide whether construct or not to construct a wind power plant at each of the 15 spots on the map (Figure 1) with a time limit (40 minutes). If all players agreed to construct, they place a windmill at the spot on the map. If they agree not to construct, they place a tree (Figures 2 and 3). They are allowed to change the pieces any time during the discussion until the time limit is met.



Figure 2 Windmill and tree game pieces



Figure 3 Players placing the pieces

At the end of the prescribed discussion time, the number of windmill and tree pieces are counted, and achievement for each player's own goals is rated. Players then receive goods or snacks according to this achievement.

2.2 Debriefing after completion of the game and the structure of WinG

In debriefing after finishing the game, participants are untied their roles. They tell about their own goals each other. A facilitator then discloses the incentive structure of interdependence: if someone achieved the best grade, (◎) the others received the third or worst grades (Δ or \times); however, there is a point at which all players are rated second best (\circ), which is optimal for the total benefit of all

members in the game. This is the structure of WinG: on one hand, it has aspects of a zero-sum game; on the other hand, it has aspects of a social dilemma.

The facilitator continues to explain that the aim of this game is not necessarily to reach the optimal point, rather to understand the factors preventing/promoting consensus and trustworthy relationships.

The facilitator encourages participants to reflect on dialogue, for example:

- Once a player is convinced that the situation is a zero-sum game, it is difficult to listen to a different opinion; thus, it is difficult to find a possible compromise.
- What is the factor of sticking to the framework of a zero-sum situation or turning their attention to a common goal?
- Information sharing is necessary but not sufficient. What is the point, then, to make shared recognition of the common goal from this shared information?
- Majority rule does not always work, similar to overstatement of the minority's opinion, as both can lose sight of the overall public benefit.

After reflection, the facilitator adds a brief explanation of the actual situation surrounding wind power plants and addresses participants' questions.

3 Conducting WinG

The following analysis aims to demonstrate that shared recognition of a common goal is related to consensus building, and that merely sharing information is not sufficient. We had two indicators of consensus: (1) variance of players' achievement in a game and (2) acceptance of the decision estimated by the players.

3.1 Method

3.1.1 Participants

We conducted 10 games with five individuals participating in each (i.e., one player for each type of role). A total of 50 individuals participated in WinG. All participants were university students.

3.1.2 Variables

Score of Common Goal Achievement First, scores of individuals' achievement were assigned based on points earned: 4 for \odot , 3 for \circ , 2 for Δ , and 1 for \times . Then, we calculated the Score of Common Goal Achievement (SCGA) using the equation below:

$$SCGA = \sqrt{\frac{\sum(3-x_i)^2}{5}} \quad (x_i = \text{individuals' achievement score of player } i)$$

When $SCGA = 0$, it means all players received a rating of 3 for individual achievement, which implies that the total benefit for all players was maximized (i.e., they found a way out of the zero-sum game). A higher SCGA means a larger difference between individuals' achievement, which implies that they failed to fulfill a common goal.

Questionnaires Participants answered a questionnaire after their game session ended. Question items included acceptance of the decision and shared recognition.

Acceptance We measured the acceptance of the final decision with three items on a 7-point scale: "I can accept the final decision concluded by the discussion," "I am satisfied with the final decision concluded by the discussion," and "I am convinced of the final decision concluded by the discussion." As confirmed internal validity was sufficient (Cronbach's $\alpha = 0.92$), the average score of the three items was used as a scale of acceptance.

Shared recognition of a common goal We measured the shared recognition of a common goal with two items on a 7-point scale: "I could share the recognition of what was common for all of us beyond different interests through discussion," and "Through discussion, all members began to share common issues and subjects despite our various interests." As confirmed internal validity was sufficient ($\alpha = 0.84$), the average score of the two items was used as a scale of shared recognition.

Resigning and abstention We measured resign: "I resigned to arranging the others opinion" and abstention: "I abstained from persisting my opinion for taking opinions of the other stakeholders. Each was measured on a 7-point scale. We obtained insufficient internal validity ($\alpha = 0.40$), each used as single items.

Stated information We listed the total amount of information, which were provided to each particular player in the beginning. In total, 40 pieces of information were listed. Recorders (different from the facilitator) checked to see if any information was provided to the other players during the discussion time. The score of the stated information was calculated by the rate of shared information in the discussion from the total amount in the game. Although this score reflects the statement of information rather than information sharing, statement of information should emerge prior to information sharing.

3.2 Results

3.2.1 Description of variables

Score of Common Goal Achievement The average SCGA was 0.80 (sd = 0.34, min = 0.45, max = 1.41). In two of the 10 games, SCGA was greater than 1.00 because players failed to make a decision in some of the 15 spots within the time limit, and received a score of 1 or 2. However, in the other games, SCGA was less than 1.00, revealing that players could achieve a consensus even though some players did not receive a good score.

Acceptance The average acceptance rate was 4.61 (sd = 1.05, min = 3.1, max = 6.1). In three of the 10 games, the acceptance rate was less than 4 (middle point), which meant that participants in these three games thought that the decision was slightly unacceptable. However, most participants in the additional seven games thought that the decision was rather acceptable, as the score was greater than the middle point.

Shared recognition The average shared recognition rate was 4.83 (sd = 0.68, min = 3.6, max = 5.6). In two of the 10 games, shared recognition was less than 4 (the middle point), but greater than the middle point in the additional eight games. Participants thought that they could share the recognition of a common goal.

Stated information The average stated information rate was 66.5% (sd = 9.4%, min = 50%, max = 78%). In general, relatively irrelevant information for the debate, such as facts about global warming, tended not to be mentioned. Additionally, disadvantageous information for a particular player also tended not to be mentioned, especially in games that had a lower stated information rate.

3.2.2 Relationships among variables

Relationships among SCGA, acceptance, shared recognition, and stated information were examined to see whether these variables affected each other.

First, a positive correlation was found between SCGA and acceptance, although it was not strong (Figure 4). This result indicates that the more often a common goal is achieved, the more evaluated the decision is found to be acceptable.

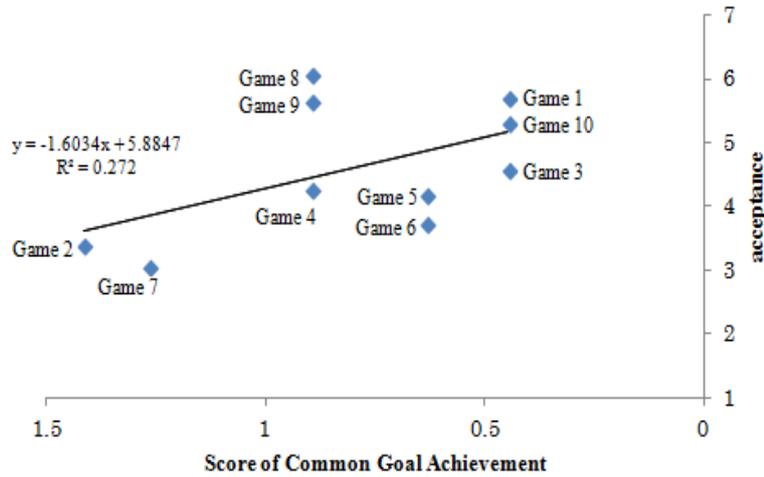


Figure 4 Relationship between common goal achievement and acceptance scores

Second, the relationship between the SCGA and shared recognition was tested and a correlation was found, which indicated that the games that achieved a common goal tended to better share this recognition (Figure 5).

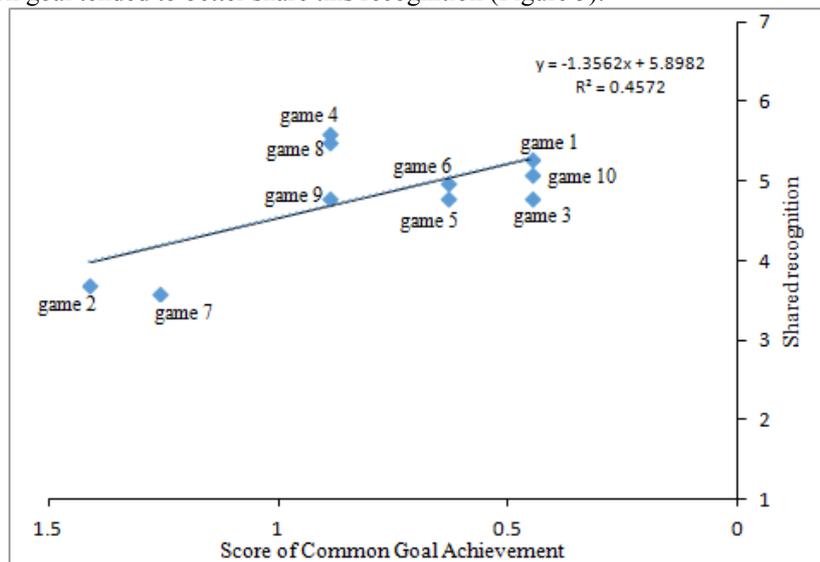


Figure 5 Relationship between common goal achievement and shared recognition scores

Next, there was little correlation found between the SCGA and stated information, suggesting that stated information per se has a weak influence on the achievement of a common goal (Figure 6).

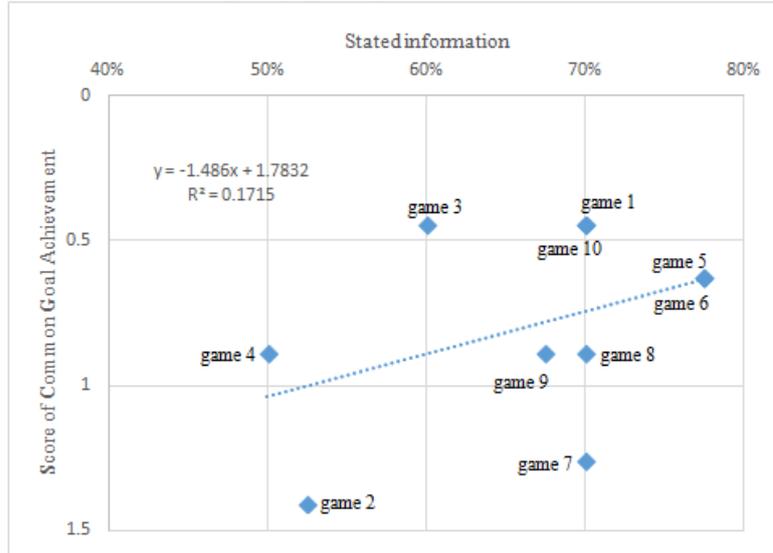


Figure 6 Relationship between common goal achievement and stated information scores

Looking at the relationship between acceptance and shared recognition, a strong correlation was found, indicating that the more shared the recognition of a common goal, the more participants were satisfied with the decision (Figure 7).

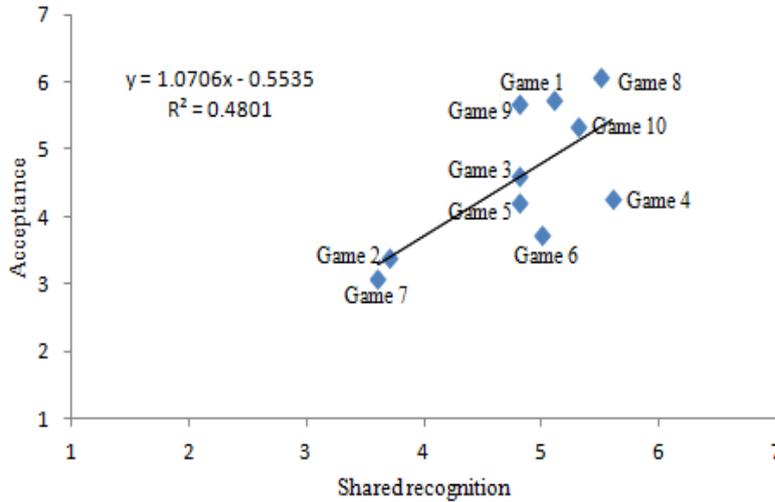


Figure 7 Relationship between acceptance and shared recognition

However, the relationship between the stated information and acceptance, and between the stated information and shared recognition was nearly zero, which indicated that only stated information did not influence shared recognition and acceptance (Figure 8 and 9). This result might suggest that information itself does not necessarily lead to shape shared recognition and acceptance, rather contributing to the procedures of disseminating this information is critical.

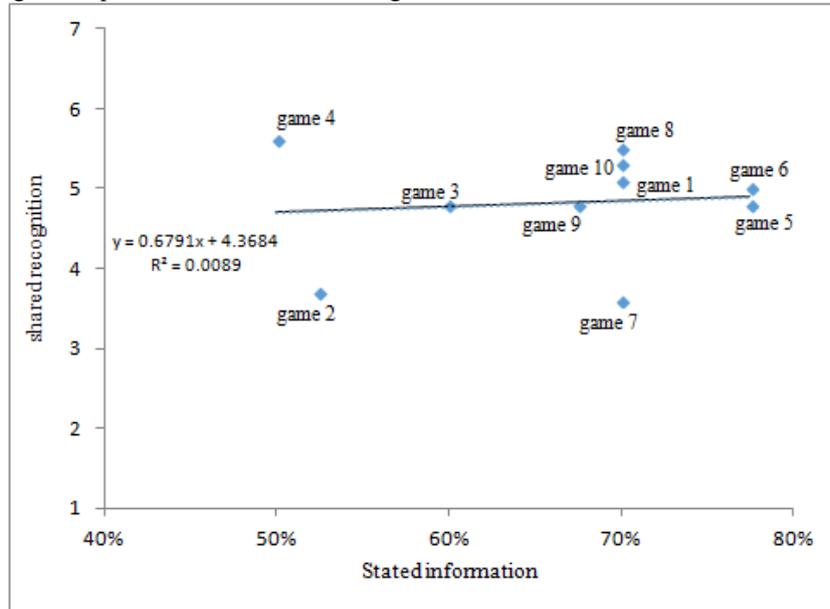


Figure 8 Relationship between stated information and shared recognition

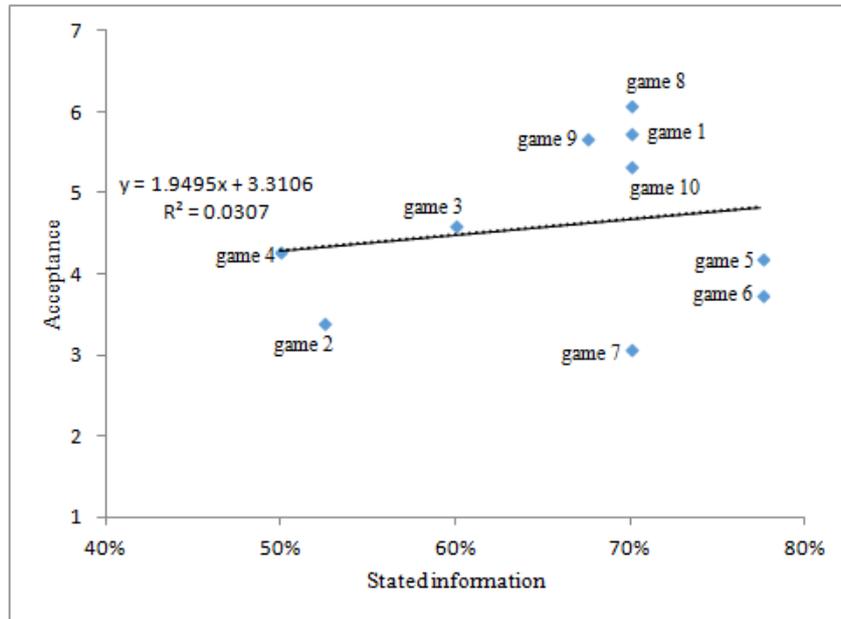


Figure 9 Relationship between stated information and acceptance

Additionally, relationship between resigning and SCGA, resigning and acceptance, abstention and SCGA, and abstention and acceptance did not have significant effects, which indicate that resign and abstention had little influence on achieving consensus and thus consensus observed in the game was not a mere compromise.

In summary, shared recognition was strongly associated with both SCGA and acceptance, while stated information was only weakly associated with SCGA and acceptance. These results demonstrate that the significance of shared recognition of a common goal, which is shaped through dialogues including what is the common subjects while admitting different interests. However, it was not sufficient for information to only be stated. Even though this study did not measure shared information directly, it was evident that a process to inform each other is more important than simply the act of informing. One possibility for this is that stated information shapes shared information, leading to shared recognition, ultimately achieving the common goal. Further investigation is needed about the process of how to realize shared recognition of a common goal.

4 Conclusion

This study proposed a hypothesis about a process of building a consensus in a situation where interests of parties are in conflict, which emphasizes shared recognition of a common goal, focusing on the aspect of a social dilemma. The results from conducting WinG demonstrated the significance of a shared recognition of a common goal, although further investigation is required.

WinG exhibits both a social dilemma and zero-sum game structure in advance. Gaming & Simulation aids in observing the processes of representing a shared recognition, crystallized by interaction. However, in reality, we never know whether an issue involves such a structure. This would suggest that the peoples' beliefs about social structure have been highly affected in the real world.

Furthermore, there was a time limit in WinG, while in reality, there is not always a time limit. More than that, postponing the decision sometimes relieve a conflict, but sometime make an issue more complicated. This study did not deal with such effects of postponement.

We need additional insight to bridge the practice in WinG with understanding social dynamics that are in practice. WinG simulated Japanese cases; therefore, it is uncertain whether it is applicable in the other countries. However, conflicts among stakeholders seem to be universal although interests are different case by case. Further modification of the rule according to situations of regions and countries would be expansive.

Acknowledgement This work was supported by the JSPS Grant-in-Aid for Scientific Research (No. 25380839) and Foundation of the Fusion of Science and Technology.

References

- Abric, J. C. (1982). Cognitive process underlying cooperation: The theory of social representation. In V. J. Derlega & J. Grzelak (Eds.), *Cooperation and helping behavior* (pp. 74–96). New York: Academic Press.
- Dawes, R. (1975). Formal models of dilemmas in social decision-making. In M. Kaplan and S. H. Schwartz (Eds.), *Human Judgment and Social Processes* (pp. 87–107). New York: Academic Press.
- Dawes, R. (1980). Social dilemmas. *Annual Review of Psychology*, 31, 169–193. doi: 10.1146/annurev.ps.31.020180.001125
- Doba, M. (2008). Towards symbiosis of individual and society: Possibilities of social dilemma approach. In M. Doba and M. Shinoki (Eds.), *Struggle between individual and society: possibility of social dilemma approach* (pp. 271–293). London: Minerva Press.
- Global Wind Energy Council (2013). Global Wind Statistics 2012. Retrieved from http://www.gwec.net/wp-content/uploads/2013/02/GWEC-PRstats-2012_english.pdf

- Hardin, G. (1968). The tragedy of the commons. *Science*, *162*, 1243–1248. doi:10.1126/science.162.3859.1243
- Marwell, G., & Schmitt, D. R. (1972). Cooperation in a three-person prisoner's dilemma. *Journal of Personality and Social Psychology*, *21*, 376–383. <http://dx.doi.org/10.1037/h0032319>
- Messick, D. M., & Brewer, M. B. (1983). Solving social dilemmas: A review. In L. Wheeler & P. Shaver (Eds.) *Review of Personality and Social Psychology*, *4*, (pp. 11–44.) Beverly Hills, CA: Sage
- Ministry of the Environment (2013). *Report of the commission on fundamental concepts of environmental impact assessment of wind power facility*. <https://www.env.go.jp/press/files/jp/17727.pdf>
- Ohnuma, S. (2009). *Effects of citizen participation program as procedural fairness on social acceptance: A case study of implementing a charge system on household waste in Sapporo*. Paper presented at the 8th Biennial Conference on Environmental Psychology, Zurich. Abstract retrieved from http://www.psychologie.uzh.ch/fachrichtungen/ehem-einheiten/sozpsy2/conference/Program_and_Abstracts.pdf
- Ohnuma, S. (2011). Social dilemma for consensus forming in environmental issues: Is it possible to adapt interests between whole society, domestic regions and individuals? In Y. Hirose (Ed.), *Learning social psychology through Simulated International Society Game* (pp. 99–113). Kyoto: Nakanishiya Press.
- Pruitt, D. G., & Kimmel, M. J. (1977). Twenty years of experimental gaming: Critique, synthesis, and suggestions for the future. *Annual Review of Psychology*, *28*, 363–392. doi: 10.1146/annurev.ps.28.020177.002051
- Sato, K., & Ohnuma, S. (2013, February). *Still controversial even though main problems have been removed: A case study of Zenibako wind power plant in Japan*. Paper presented at the Conference on Wind power and Environmental impacts, Stockholm. Abstract retrieved from <http://www.naturvardsverket.se/Nerladdningssida/?fileType=pdf&downloadUrl=/Documents/publikationer6400/978-91-620-6546-1.pdf>
- Yamagishi, T. (1986). The provision of a sanctioning system as a public good. *Journal of Personality and Social Psychology*, *51*, 110–116. <http://dx.doi.org/10.1037/0022-3514.51.1.110>
- Yamagishi, T. (1988). Seriousness of social dilemmas and the provision of a sanctioning system. *Social Psychology Quarterly*, *51*, 32–42. <http://www.jstor.org/stable/2786982>