

Online Resource 5

- Article Title: Effect of the discussion frame on finding a compromise: A group decision experiment about removed soil management in Japan
- Journal: Environmental management
- Authors name: Yume Souma, Yukihide Shibata, Mie Tsujimoto, Qinglin Cui, Takashi Nakazawa, Tomoyuki Tatsumi, Yoshiko Arima, Susumu Ohnuma
- Correspondence author: Yume Souma (souma.yume.l6@elms.hokudai.ac.jp)
- Description: We show the results of opinion changes from the next page. The analysis conducted a multilevel linear regression with the responses to each item as the dependent variable, condition (0: controversial condition, 1: inclusive condition), time (0: before, 1: after), and the interaction effect as predictor variables. Here, the results of items not included in the results section of this article are shown. For each item, we present the results of the multilevel linear regression analysis on the average opinion and variance in order, attaching the plot of the average and variance before and after discussion within the group by the group's decision.

Item 1) Conducting the final disposal *within* the Fukushima prefecture

Table S1 shows the average opinions before and after the discussions by condition. The results of multilevel linear regression analysis indicated that the 95% confidence intervals for each parameter crossed zero (the estimated effect of the condition, the time, and the interaction were, respectively, $\beta = 0.21$, 95% CI = [-1.17, 0.25]; $\beta = -0.14$, 95% CI = [-0.70, 0.42]; $\beta = -0.05$, 95% CI = [-0.85, 0.74]). Figure S1 presents the average for each group before and after the discussion of the item according to the group's decision.

Table S1 Changes in the average opinions of “Conducting the final disposal within Fukushima prefecture”

	Controversial condition		Inclusive condition	
	Average of pre-opinion	Average of post-opinion	Average of pre-opinion	Average of post-opinion
Conducting the final disposal within Fukushima prefecture	3.77	3.62	3.97	3.78

Fig. S1 Average opinion of each group by condition and decision in “Conducting the final disposal within Fukushima prefecture” (left side: controversial condition, right side: inclusive condition)

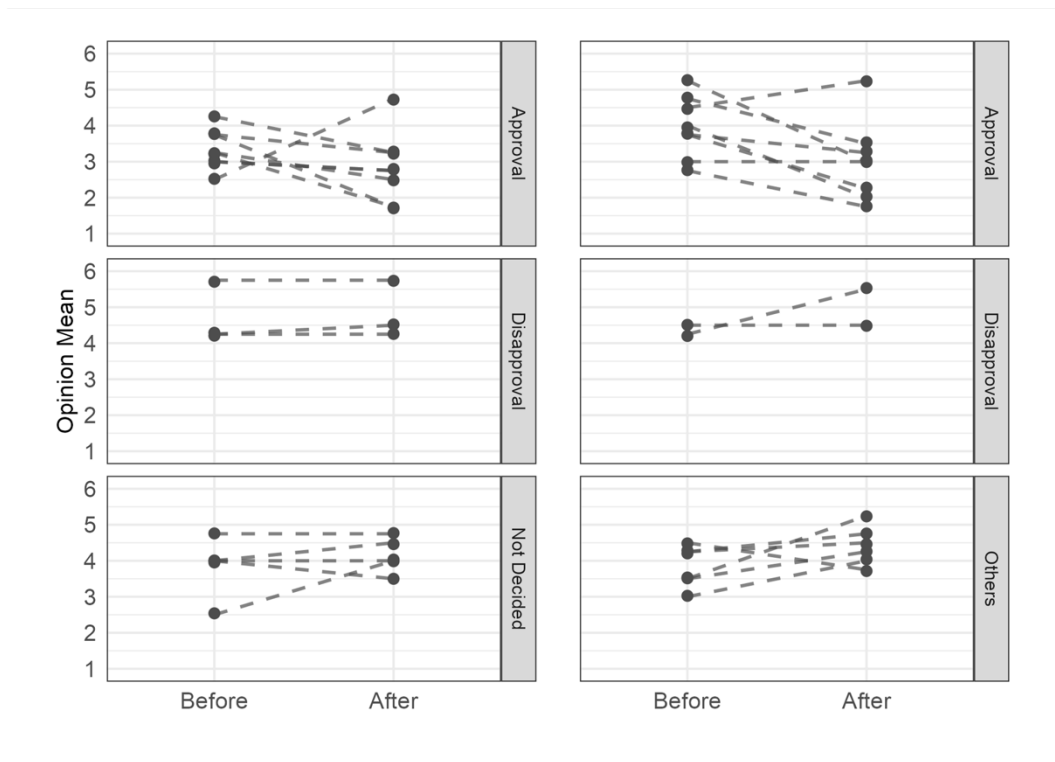


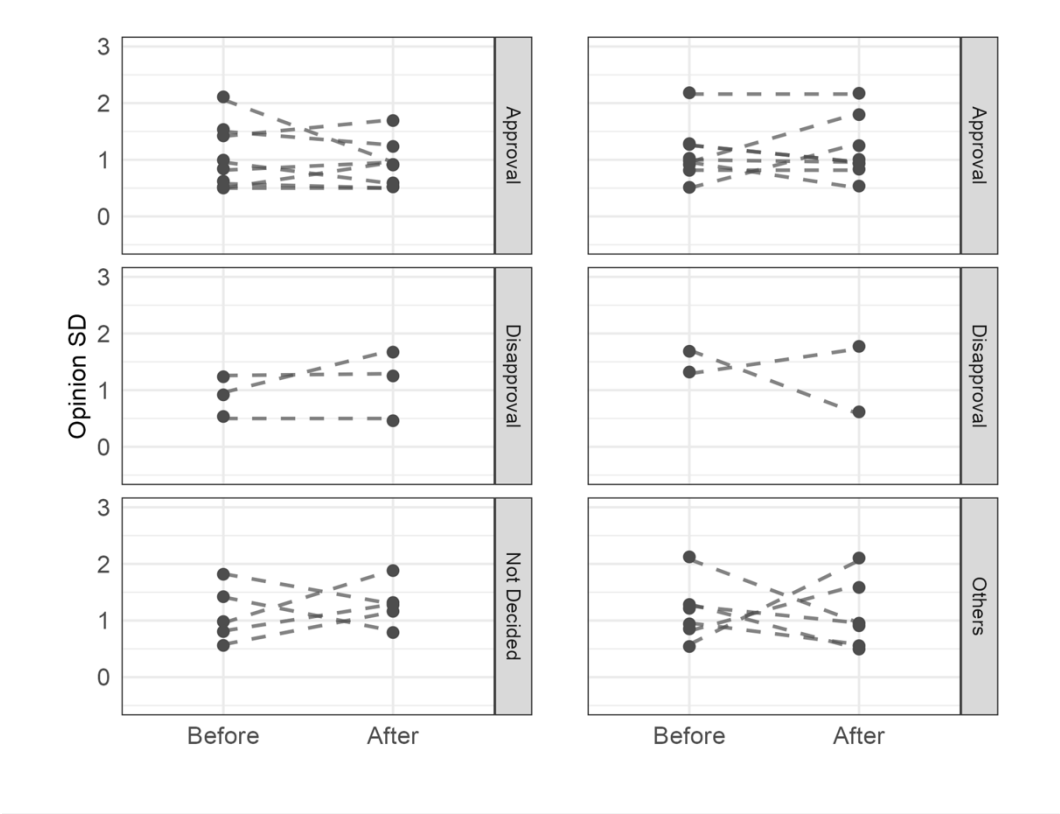
Table S2 presents the variance within the group before and after the discussion based on the conditions. The results of multilevel linear regression analysis indicated that the 95% confidence

intervals for each parameter crossed zero (the estimated effect of condition, time, and the interaction were respectively, $\beta = 0.15$, 95% CI = [-0.22, 0.51]; $\beta = 0.05$, 95% CI = [-0.28, 0.39]; $\beta = -0.08$, 95% CI = [-0.55, 0.39]). Figure S2 presents the variance within the group before and after discussions of the item based on the group’s decision.

Table S2 Changes in the average of SD of “Conducting the final disposal within Fukushima prefecture”

	Controversial condition		Inclusive condition	
	Average of SD before discussion	Average of SD after discussion	Average of SD before discussion	Average of SD after discussion
Conducting the final disposal within Fukushima prefecture	1.04	1.09	1.18	1.15

Fig. S2 Average of SD by each group in “Conducting the final disposal within Fukushima prefecture” (left side: controversial condition, right side: inclusive condition)



Item 2) Implementing the reuse of the low-concentrated soil

Table S3 shows the opinion averages before and after the discussions by condition. The results of multilevel linear regression analysis suggested that responses after discussions were more positive than those before discussions ($\beta = 0.33$ 95% CI = [0.10, 0.56]). However, there were no other effects on the item (the estimated effect of the condition and the interaction were, respectively, $\beta = -0.05$, 95% CI = [-0.30, 0.21]; $\beta = -0.07$, 95% CI = [-0.39, 0.25]). Figure S3 shows the average for each group before and after the discussion of the item according to the group's decision.

Table S3 Changes in the average opinions of “Implementing the reuse of the low-concentrated soil”

	Controversial condition		Inclusive condition	
	Average of pre-opinion	Average of post-opinion	Average of pre-opinion	Average of post-opinion
Implementing the reuse of the low-concentrated soil	5.55	5.88	5.50	5.77

Fig. S3 Average opinion of each group by condition and decision in “Implementing the reuse of the low-concentrated soil” (left side: controversial condition, right side: inclusive condition)

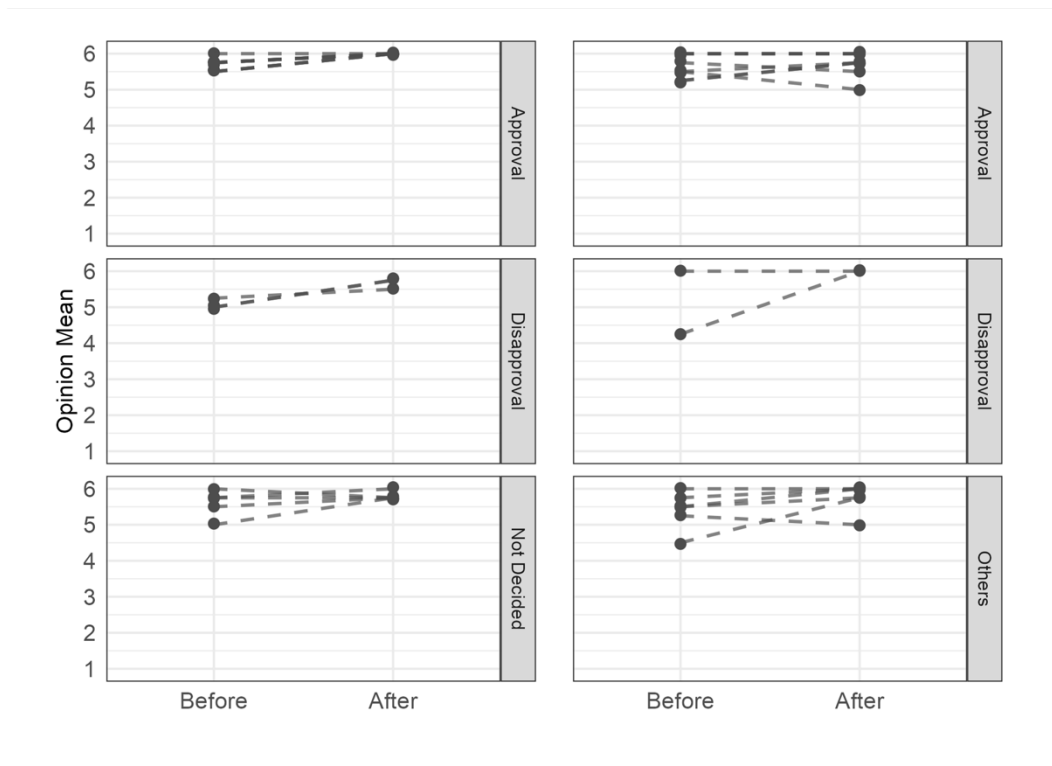


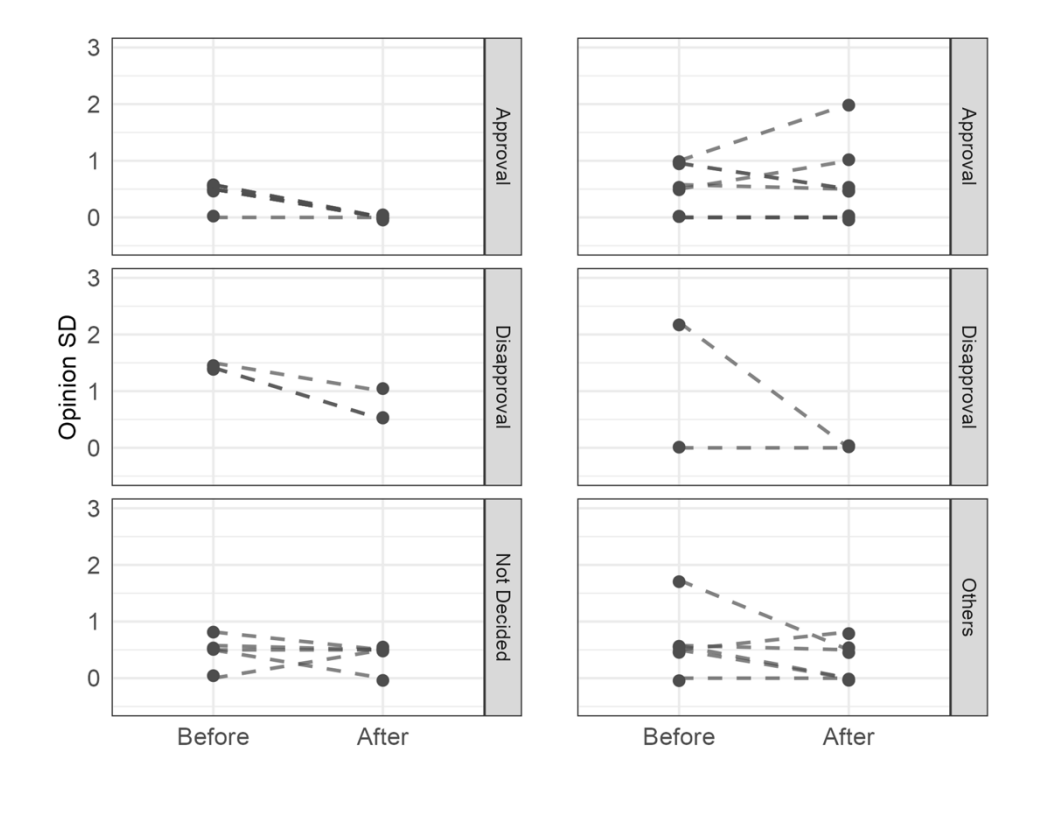
Table S4 presents the variance within the group before and after the discussion based on the conditions. The results of multilevel linear regression analysis indicated that variances within the group were getting smaller from before to after discussions ($\beta = -0.40$, 95% CI = [-0.71, -0.09]).

However, we did not find any other effects on the item (the estimated effects of the condition and the interaction were, respectively, $\beta = -0.02$, 95% CI = [-0.36, 0.33]; $\beta = 0.16$, 95% CI = [-0.27, 0.59]). Figure S4 presents the variance within the group before and after discussions on the item according to the group's decision.

Table S4 Changes in the average of SD of “Implementing the reuse of the low-concentrated soil”

	Controversial condition		Inclusive condition	
	Average of SD before discussion	Average of SD after discussion	Average of SD before discussion	Average of SD after discussion
Implementing the reuse of the low-concentrated soil	0.65	0.25	0.63	0.39

Fig. S4 Average of SD by each group in “Implementing the reuse of the low-concentrated soil” (left side: controversial condition, right side: inclusive condition)



Item 3) Reuse of low-concentration soil at a single location

Table S5 shows the average opinions before and after the discussions by condition. The results of multilevel linear regression analysis indicated that the 95% confidence intervals for each parameter crossed zero (the estimated effect of the condition, the time, and the interaction were, respectively, $\beta = 0.42$, 95% CI = [-0.27, 1.10]; $\beta = -0.19$, 95% CI = [-0.77, 0.36]; $\beta = -0.48$, 95% CI = [-1.30, 0.34]). Figure S5 presents the average for each group before and after discussions on the item according to the group's decision.

Table S5 Changes in the average opinions of “Conducting the reuse of the low-concentrated soil at a single location”

	Controversial condition		Inclusive condition	
	Average of pre-opinion	Average of post-opinion	Average of pre-opinion	Average of post-opinion
Conducting the reuse of the low-concentrated soil at a single location	3.16	2.97	3.58	2.91

Fig. S5 Average opinion of each group by condition and decision in “Conducting the reuse of the low-concentrated soil at a single location” (left side: controversial condition, right side: inclusive condition)

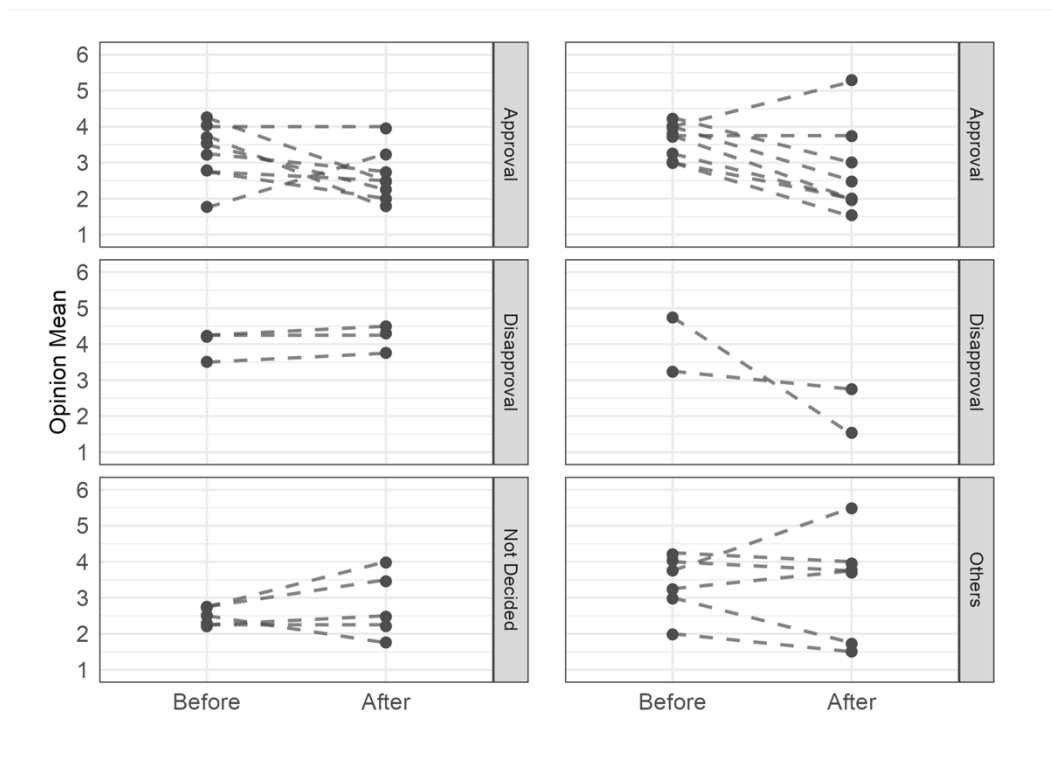
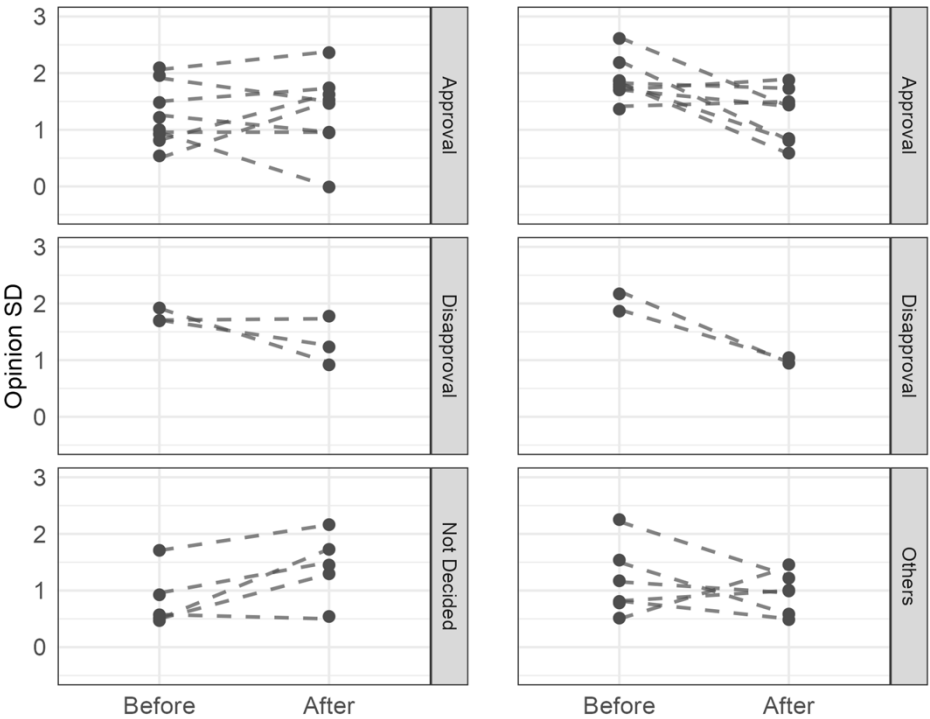


Table S6 presents the variance within the group before and after the discussion based on the conditions. From the results of multilevel linear regression analysis, we found the effect of the conditions and the interaction effect between the condition and the time (the estimated effect of the conditions and the interaction were, respectively, $\beta = 0.41$, 95% CI = [0.03, 0.80]; $\beta = -0.66$, 95% CI = [-1.15, -0.18]). In the controversial condition, the variance of the item was unlikely to change through discussion. On the other hand, in the inclusive condition, the variance of the item reduced after discussion. Figure S6 presents the variance within the group before and after discussions on the item according to the group's decision.

Table S6 Changes in the average of SD of “Conducting the reuse of the low-concentrated soil at a single location”

	Controversial condition		Inclusive condition	
	Average of SD before discussion	Average of SD after discussion	Average of SD before discussion	Average of SD after discussion
Conducting the reuse of the low-concentrated soil at a single location	1.22	1.36	1.64	1.11

Fig. S6 Average of SD by each group in “Conducting the reuse of the low-concentrated soil at a single location” (left side: controversial condition, right side: inclusive condition)



Item 4) Conducting the reuse of the low-concentrated soil at multiple locations

Table S7 shows the opinion averages before and after the discussions according to the conditions. The results of multilevel linear regression analysis suggested that responses after discussions were more positive than those before discussions ($\beta = 0.63$, 95% CI = [0.11, 1.14]). However, there were no other effects on the item (the estimated effect of the condition and the interaction were, respectively, $\beta = 0.01$, 95% CI = [-0.56, 0.55]; $\beta = 0.04$, 95% CI = [-0.71, 0.80]). Figure S7 presents the average for each group before and after discussions on the item according to the group's decision.

Table S7 Changes in the average opinions of “Conducting the reuse of the low-concentrated soil at multiple locations”

	Controversial condition		Inclusive condition	
	Average of pre-opinion	Average of post-opinion	Average of pre-opinion	Average of post-opinion
Conducting the reuse of the low-concentrated soil at multiple locations	4.47	5.09	4.47	5.14

Fig. S7 Average opinion of each group by condition and decision in “Conducting the reuse of the low-concentrated soil at multiple locations” (left side: controversial condition, right side: inclusive condition)

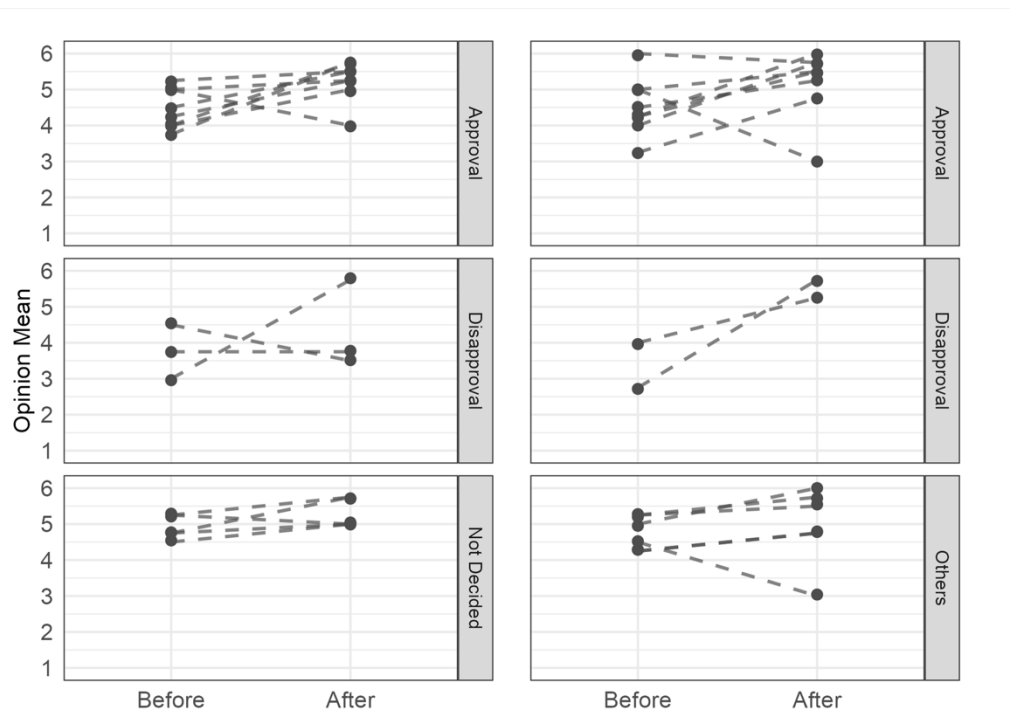
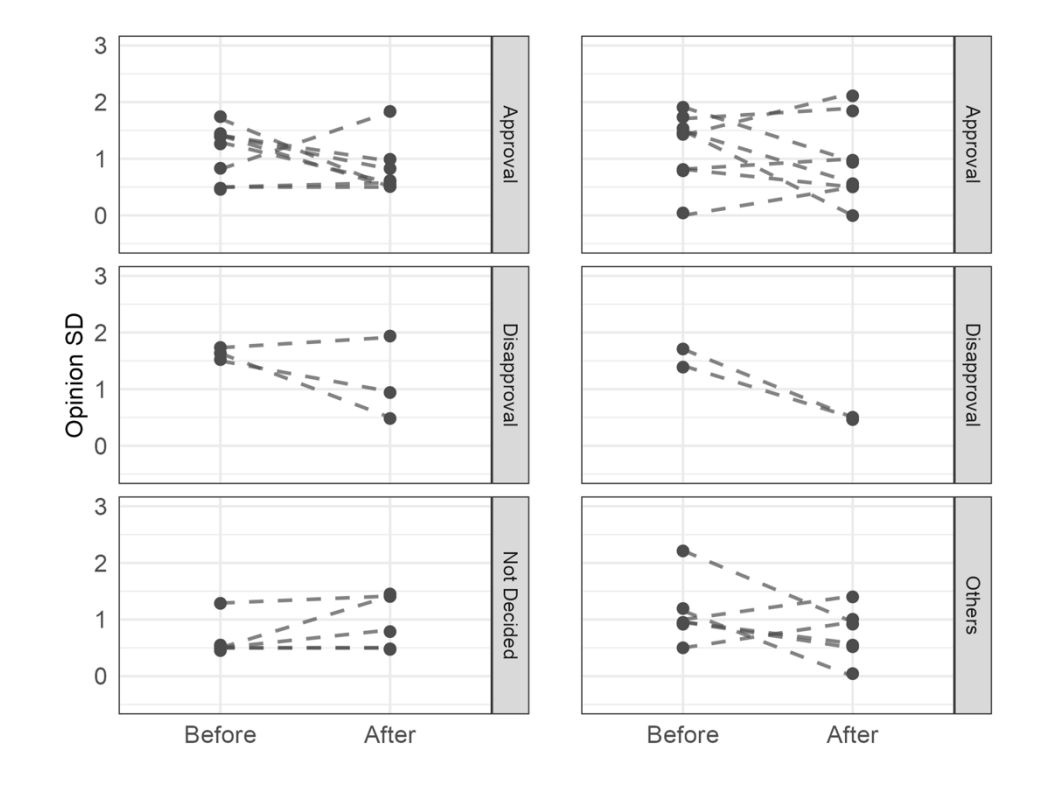


Table S8 shows the variance within the group before and after the discussion based on the conditions. The results of multilevel linear regression analysis indicated that the 95% confidence intervals for each parameter crossed zero (the estimated effect of the condition, the time, and the interaction were, respectively, $\beta = 0.14$, 95% CI = [-0.24, 0.52]; $\beta = -0.19$, 95% CI = [-0.54, 0.17]; $\beta = -0.22$, 95% CI = [-0.73, 0.26]). Figure S8 presents the variance within the group before and after discussions on the item according to the group's decision.

Table S8 Changes in the average of SD of “Conducting the reuse of the low-concentrated soil at multiple locations”

	Controversial condition		Inclusive condition	
	Average of SD before discussion	Average of SD after discussion	Average of SD before discussion	Average of SD after discussion
Conducting the reuse of the low-concentrated soil at multiple locations	1.08	0.89	1.22	0.81

Fig. S8 Average of SD by each group in “Conducting the reuse of the low-concentrated soil at multiple locations” (left side: controversial condition, right side: inclusive condition)



Item 5) Conducting the reuse of the low-concentrated soil except for the Fukushima prefecture

Table S9 shows the average opinions before and after the discussions by condition. The results of multilevel linear regression analysis indicated that the 95% confidence intervals for each parameter crossed zero (the estimated effect of the condition, the time, and the interaction were, respectively, $\beta = -0.17$, 95% CI = [-0.76, 0.43]; $\beta = 0.30$, 95% CI = [-0.27, 0.86]; $\beta = -0.09$, 95% CI = [-0.89, 0.71]). Figure S9 presents the average for each group before and after discussions on the item, according to the group's decision.

Table S9 Changes in the average opinions of “Conducting the reuse of the low-concentrated soil except for Fukushima prefecture”

	Controversial condition		Inclusive condition	
	Average of pre-opinion	Average of post-opinion	Average of pre-opinion	Average of post-opinion
Conducting the reuse of the low-concentrated soil except for Fukushima prefecture	4.77	5.06	4.59	4.80

Fig. S9 Average opinion of each group by condition and decision in “Conducting the reuse of the low-concentrated soil except for Fukushima prefecture” (left side: controversial condition, right side: inclusive condition)

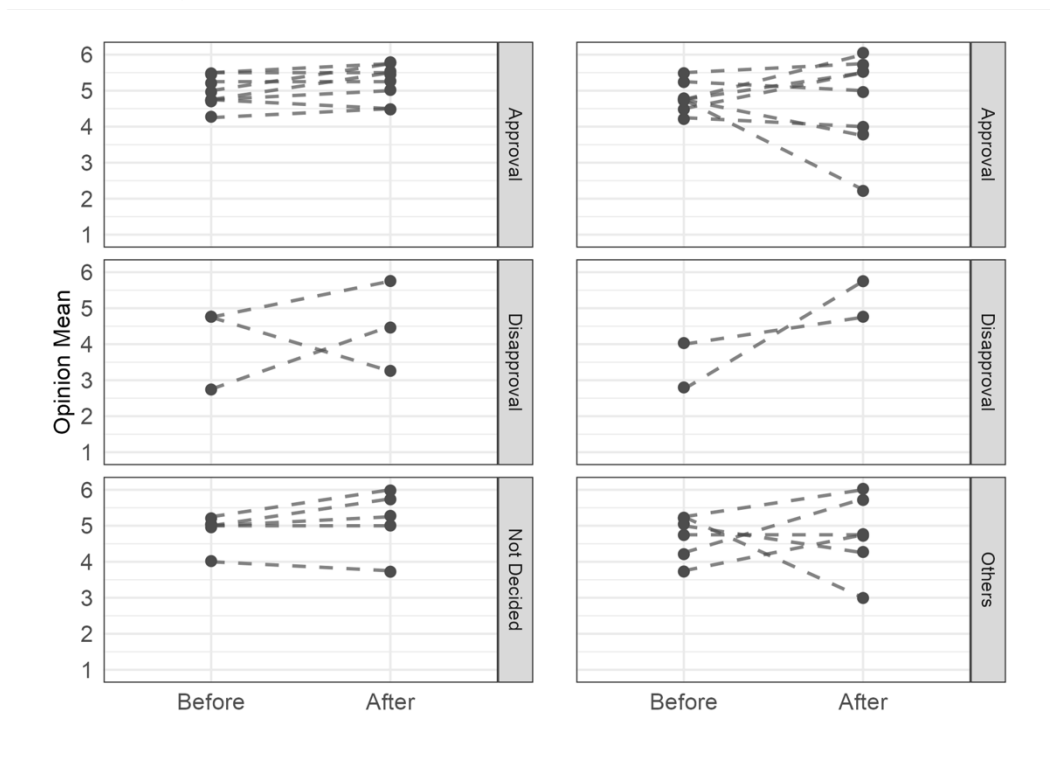
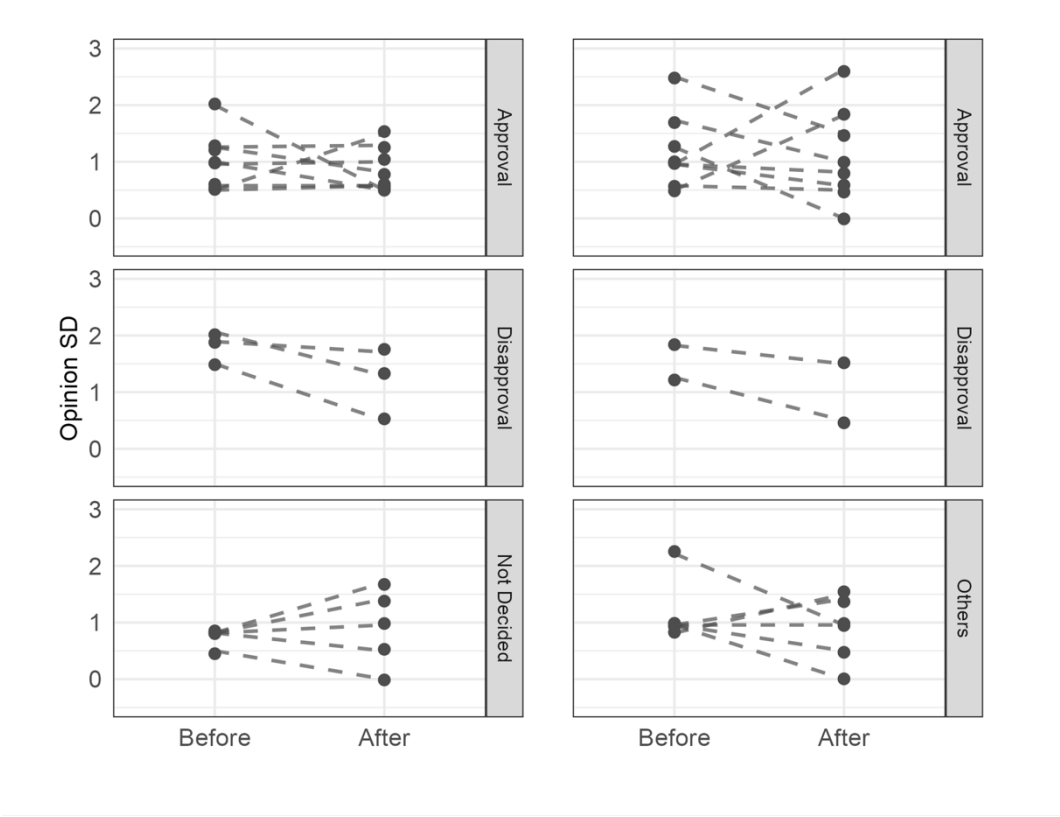


Table S10 shows the variance within the group before and after the discussion based on the conditions. The results of multilevel linear regression analysis indicated that the 95% confidence intervals for each parameter crossed zero (the estimated effect of the condition, the time, and the interaction were, respectively, $\beta = 0.13$, 95% CI = [-0.29, 0.53]; $\beta = -0.15$, 95% CI = [-0.53, 0.24]; $\beta = -0.05$, 95% CI = [-0.61, 0.49]). Figure S10 presents the variance within the group before and after discussions on the item, according to the group's decision.

Table S10 Changes in the average of SD of “Conducting the reuse of the low-concentrated soil except for Fukushima prefecture”

	Controversial condition		Inclusive condition	
	Average of SD before discussion	Average of SD after discussion	Average of SD before discussion	Average of SD after discussion
Conducting the reuse of the low-concentrated soil except for Fukushima prefecture	1.08	0.93	1.21	1.01

Fig. S10 Average of SD by each group in “Conducting the reuse of the low-concentrated soil except for Fukushima prefecture” (left side: controversial condition, right side: inclusive condition)



Item 6) Conducting the reuse of the low-concentrated soil including the Fukushima prefecture

Table S11 shows the opinion averages before and after the discussions based on the conditions. The results of multilevel linear regression analysis suggested that responses after discussions were more positive than those before discussions ($\beta = 0.36$, 95% CI = [0.02, 0.71]). However, there were no other effects on the item (the estimated effect of the condition and the interaction were, respectively, $\beta = 0.00$, 95% CI = [-0.36, 0.37]; $\beta = -0.09$, 95% CI = [-0.59, 0.39]). Figure S11 presents the average for each group before and after discussions on the item, according to the group's decision.

Table S11 Changes in the average opinions of “Conducting the reuse of the low-concentrated soil including Fukushima prefecture”

	Controversial condition		Inclusive condition	
	Average of pre-opinion	Average of post-opinion	Average of pre-opinion	Average of post-opinion
Conducting the reuse of the low-concentrated soil including Fukushima prefecture	5.20	5.56	5.20	5.47

Fig. S11 Average opinion of each group by condition and decision in “Conducting the reuse of the low-concentrated soil including Fukushima prefecture” (left side: controversial condition, right side: inclusive condition)

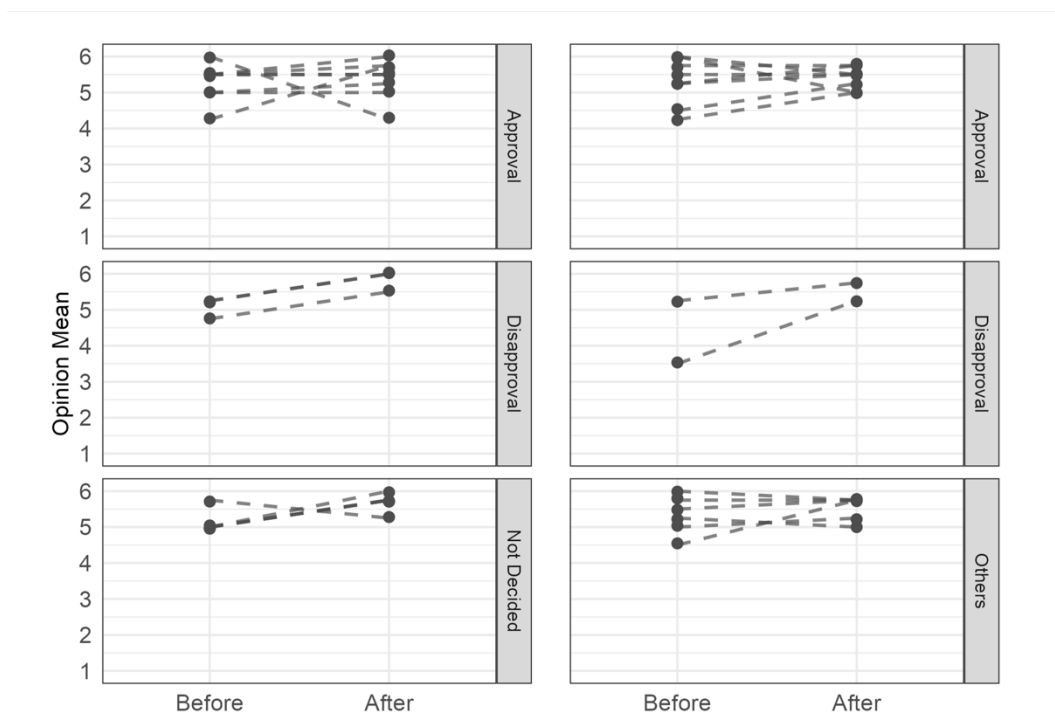
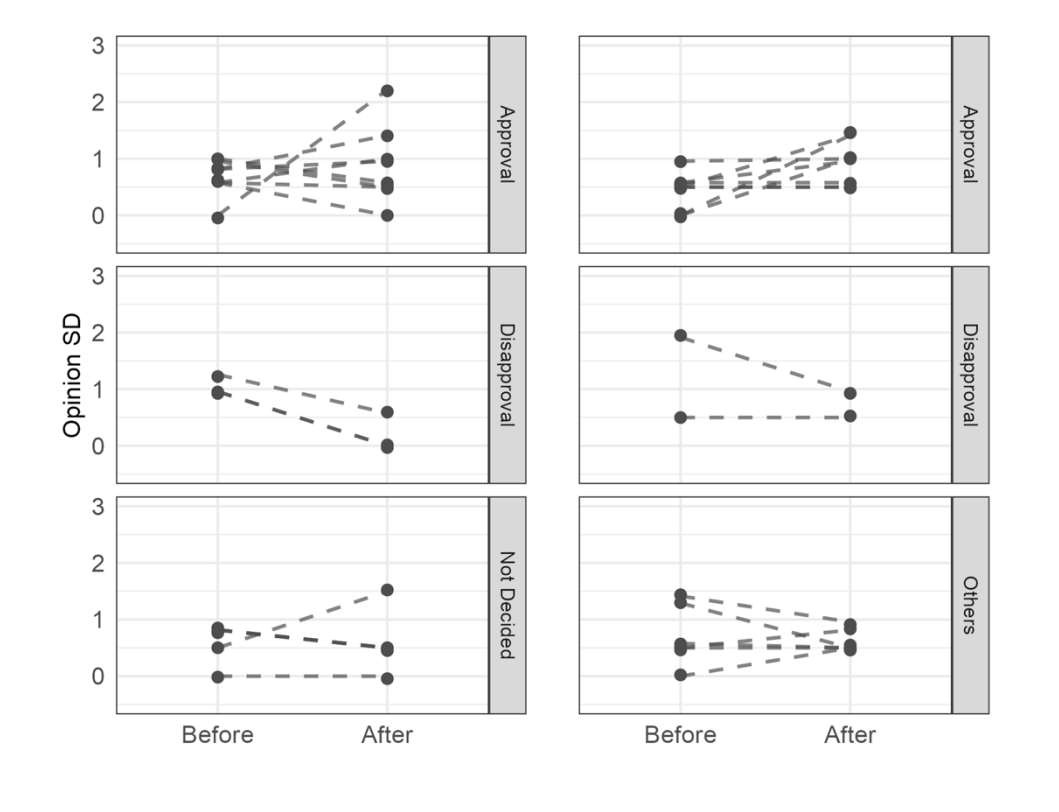


Table S12 shows the variance within the group before and after the discussion based on the conditions. The results of multilevel linear regression analysis indicated that the 95% confidence intervals for each parameter crossed zero (the estimated effect of the condition, the time, and the interaction were, respectively, $\beta = -0.07$, 95% CI = [-0.39, 0.26]; $\beta = -0.04$, 95% CI = [-0.35, 0.28]; $\beta = 0.18$, 95% CI = [-0.28, 0.63]). Figure S12 presents the variance within the group before and after discussions on the item, according to the group's decision.

Table S12 Changes in the average of SD of “Conducting the reuse of the low-concentrated soil including Fukushima prefecture”

	Controversial condition		Inclusive condition	
	Average of SD before discussion	Average of SD after discussion	Average of SD before discussion	Average of SD after discussion
Conducting the reuse of the low-concentrated soil including Fukushima prefecture	0.72	0.67	0.64	0.79

Fig. S12 Average of SD by each group in “Conducting the reuse of the low-concentrated soil including Fukushima prefecture” (left side: controversial condition, right side: inclusive condition)



Item 7) Conducting the final disposal at a single site

Table S13 shows the average opinions before and after the discussions by condition. The results of multilevel linear regression analysis indicated that the 95% confidence intervals for each parameter crossed zero (the estimated effect of the condition, the time, and the interaction were, respectively, $\beta = 0.06$, 95% CI = [-0.78, 0.90]; $\beta = -0.15$, 95% CI = [-0.92, 0.61]; $\beta = -0.52$, 95% CI = [-1.59, 0.58]). Figure S13 presents the average for each group before and after discussions on the item according to the group's decision.

Table S13 Changes in the average opinions of “Conducting the final disposal at a single site”

	Controversial condition		Inclusive condition	
	Average of pre-opinion	Average of post-opinion	Average of pre-opinion	Average of post-opinion
Conducting the final disposal at a single site	3.83	3.67	3.89	3.22

Fig. S13 Average opinion of each group by condition and decision in “Conducting the final disposal at a single site” (left side: controversial condition, right side: inclusive condition)

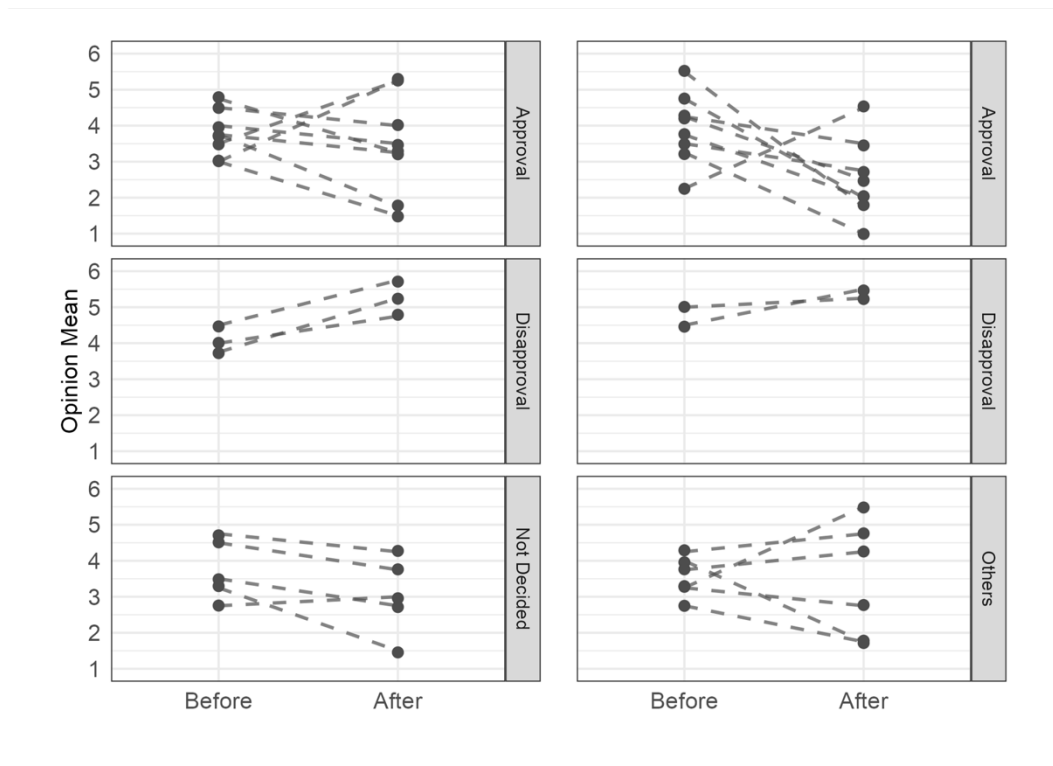


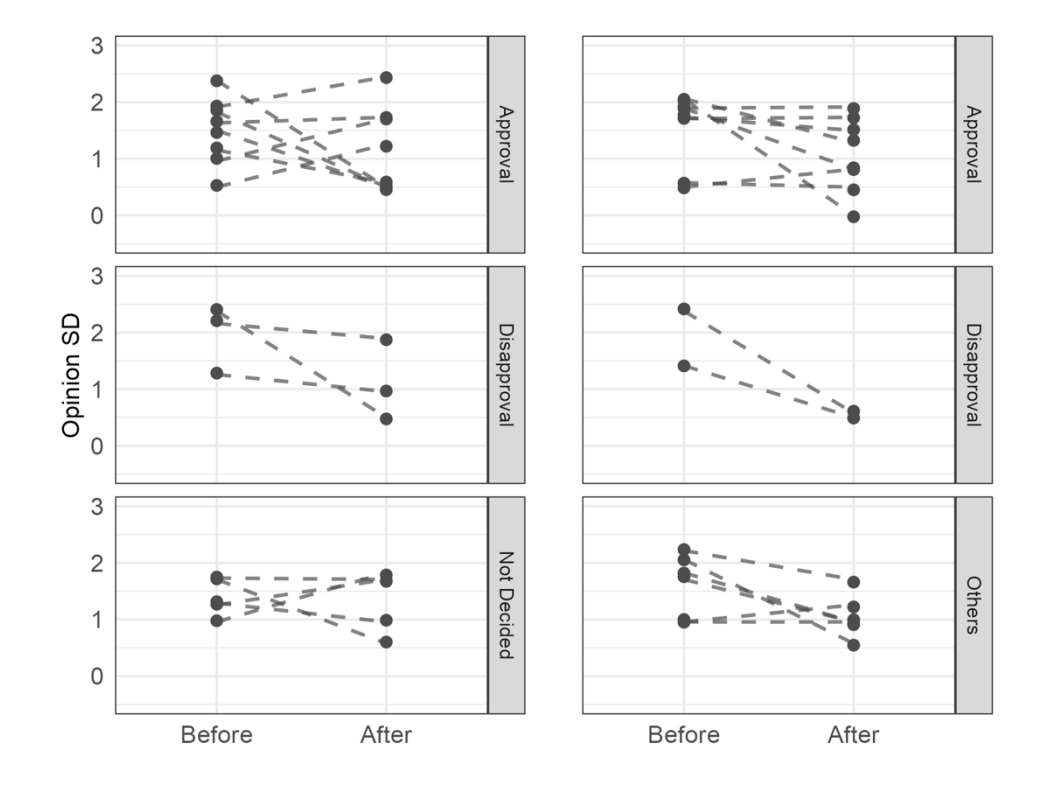
Table S14 shows the variance within the group before and after the discussion based on the conditions. The results of multilevel linear regression analysis indicated that the 95% confidence

intervals for each parameter crossed zero (the estimated effect of the condition, the time, and the interaction were, respectively, $\beta = 0.08$, 95% CI = [-0.33, 0.49]; $\beta = -0.33$, 95% CI = [-0.71, 0.06]; $\beta = -0.29$, 95% CI = [-0.82, 0.26]). Figure S14 presents the variance within the group before and after discussions on the item, according to the group’s decision.

Table S14 Changes in the average of SD of “Conducting the final disposal at a single site”

	Controversial condition		Inclusive condition	
	Average of SD before discussion	Average of SD after discussion	Average of SD before discussion	Average of SD after discussion
Conducting the final disposal at a single site	1.54	1.21	1.62	1.00

Fig. S14 Average of SD by each group in “Conducting the final disposal at a single site” (left side: controversial condition, right side: inclusive condition)



Item 8) Conducting final disposal at plural sites

Table S15 shows the average opinions before and after the discussions by condition. The results of multilevel linear regression analysis indicated that the 95% confidence intervals for each parameter crossed zero (the estimated effect of the condition, the time, and the interaction were, respectively, $\beta = 0.01$, 95% CI = [-0.77, 0.79]; $\beta = 0.15$, 95% CI = [-0.58, 0.84]; $\beta = 0.43$, 95% CI = [-0.55, 1.44]). Figure S15 presents the average for each group before and after discussions on the item according to the group's decision.

Table S15 Changes in the average opinions of “Conducting final disposal at plural sites”

	Controversial condition		Inclusive condition	
	Average of pre-opinion	Average of post-opinion	Average of pre-opinion	Average of post-opinion
Conducting final disposal at plural sites	3.50	3.66	3.52	4.09

Fig. S15 Average opinion of each group by condition and decision in “Conducting final disposal at plural sites” (left side: controversial condition, right side: inclusive condition)

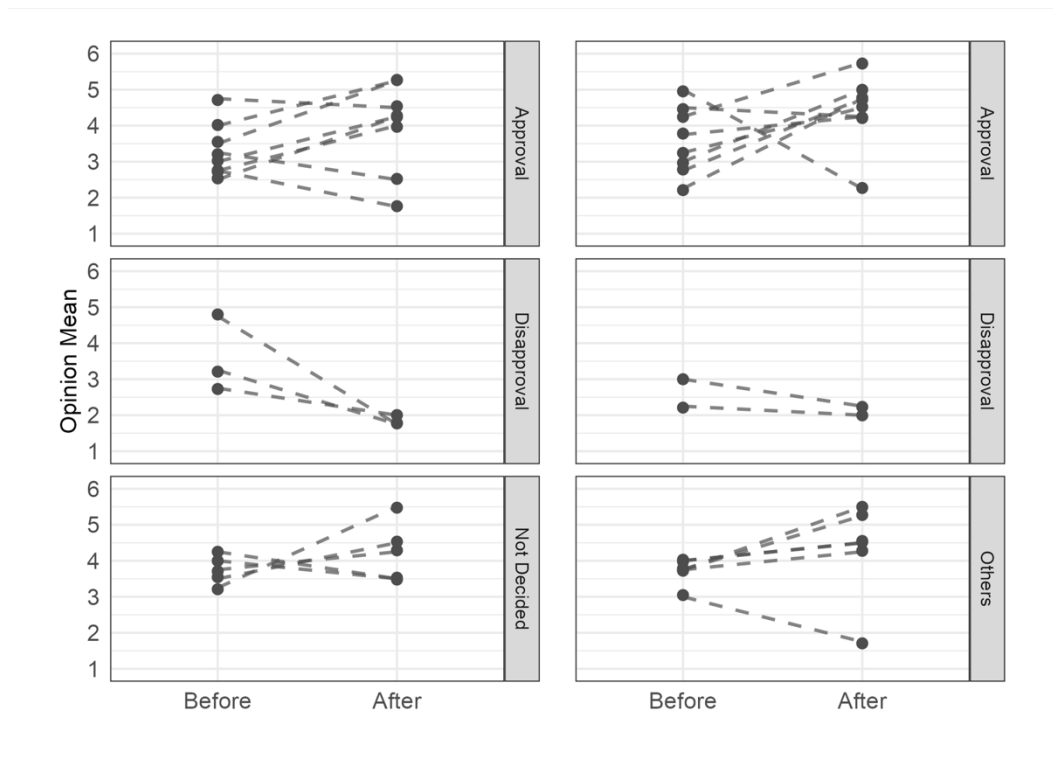


Table S16 presents the variance within the group before and after the discussion based on the conditions. The results of multilevel linear regression analysis indicated that variances within the

group were getting smaller from before to after discussions ($\beta = -0.47$, 95% CI = [-0.78, -0.16]). However, we did not find any other effects on the item (the estimated effects of the condition and the interaction were, respectively, $\beta = -0.04$, 95% CI = [-0.36, 0.26]; $\beta = 0.03$, 95% CI = [-0.40, 0.46]). Figure S16 presents the variance within the group before and after discussions on the item, according to the group's decision.

Table S16 Changes in the average of SD of “Conducting final disposal at plural sites”

	Controversial condition		Inclusive condition	
	Average of SD before discussion	Average of SD after discussion	Average of SD before discussion	Average of SD after discussion
Conducting final disposal at plural sites	1.45	0.98	1.41	0.96

Fig. S16 Average of SD by each group in “Conducting final disposal at plural sites” (left side: controversial condition, right side: inclusive condition)

