

The Effects of the Anger Rumination Trait on Anger, Perception of Others' Intent, and Motivation for Retaliation¹⁾

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The purpose of the study was to examine the influence of the anger rumination trait on anger and perception of others' intent changes, as well as the relationship among the anger rumination trait, anger, perception of others' intent, and motivation for retaliation. Participants were 175 undergraduate students. The results indicated that an anger rumination trait interfered with the mitigation of anger and perception of others' intent, and others' intent partially mediated the effect of anger rumination on anger after a week. Furthermore, it was shown that anger rumination motivated retaliation. This suggests that anger rumination influences not only the mitigation of anger but also the perception of others' intent and motivation for retaliation.

key words: anger rumination trait, anger, perception of others' intent, retaliation

Introduction

Some people tend to continue thinking about experiences that cause anger and recall them for an extended period. Anger rumination has been defined as a tendency to engage in unintentionally recurring thoughts about angry episodes, and the Anger Rumination Scale (ARS) has been developed to measure it (Sukhodolsky, Golub, & Cromwell, 2001). Research indicates that the anger rumination trait is a predictor of anger and aggression (Anestis, Anestis, Selby, & Joiner, 2009; Peled and Moretti, 2007), and is positively correlated with both the suppression and expression of anger (Sukhodolsky et al., 2001). Some studies indicate that anger increases even more when anger rumination is manipulated by focusing on anger-provoking events (e.g., Rusting & Nolen-Hoeksema, 1998; Bushman, 2002).

While there is some research on anger rumina-

tion, questions remain regarding its effects. First, the impact of anger rumination on the perception of events that caused anger is unknown. Second, there are few studies on the influence of anger rumination on the long-term evolution of anger in daily life. Additional research is needed to investigate the link between anger rumination and its effects on an individual's perspective. The purpose of this study was to examine the influence of the anger rumination trait on changes in anger and perception of events that caused anger, as well as the relationship among the anger rumination trait, anger, and perception of events that caused anger. Subsequently, it also examined the relationship between these factors and motivation for retaliation as a substitute for aggressive behavior and anger expression.

Effects of the Anger Rumination Trait

Previous studies have indicated that manipulated anger rumination amplifies anger and prompts ag-

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gressive behavior (e.g., Rusting & Nolen-Hoeksema, 1998; Bushman, 2002). It is thought that this effect of anger rumination is temporal because anger is mitigated 15 minutes after rumination stops (Denson, Moulds & Grisham, 2012), and there is no difference after several minutes between the rumination and reappraisal conditions (Ray, Wilhelm, & Gross, 2008). These results suggest that anger is temporarily exacerbated by rumination and is eventually mitigated. Therefore, people who are likely to ruminate need time to allay anger because they repeatedly experience exacerbated anger from rumination.

The mitigation of anger can be delayed by the perception of the anger-eliciting event. Previous studies indicate that the evaluation of anger mediated between the triggering event and displaced aggression for people who had been induced to ruminate about the provocation (Bushman, Bonacci, Pedersen, Vasquez, & Miller, 2005). Furthermore, rumination heightens the cognitive accessibility of action and affect related to aggression (Pedersen, Denson, Goss, Vasquez, Kelley, & Miller, 2011). These studies suggest that anger rumination influences not only anger, but also the perception of anger-provoking events.

The perception of anger-provoking events has been found to be an important cognitive component in the process of evoking anger, such that the intent of the other person is critical in provoking anger (Averill, 1983; Ferguson & Rule, 1983). In this study, one's perception of others' intent is regarded as a part of cognition, where cognition is understood broadly. It is thought that the anger rumination trait influences such perception because it prompts individuals to have repetitive thoughts about the causes and results of an anger episode (Sukhodolsky et al., 2001).

Recently, it has been shown that the more likely a person is to hostile attribution bias, the higher the anger rumination trait (Wang, Cao, Dong, & Xia, 2019; Quan, Wang, Gong, Lei, Liang, & Zhan, 2022). Cognitive bias refers to a distorted interpretation of events in ambiguous situations, one of which is hos-

tile attribution bias, that is, the tendency to attribute hostile intent to others' actions even if the others' intent is uncertain or benign (Kokkinos, Karagianni, & Voulgaridou, 2017). It is assumed that the anger rumination trait consisting of repetitive thoughts would maintain the biased perception that the other acted intentionally because the frequency of perceiving the others' intent is higher in the long term. Therefore, it seems that people with high anger rumination traits would perceive others' intent more than those who are not, even if time has passed.

Perceptions of the other person's intention is an important factor that arouses anger (Averill, 1983; Ferguson & Rule, 1984), and anger is also frequently caused by the repeated arousal of the perception of the others' intention by the anger-ruminating trait. It has been suggested that rumination of anger temporarily amplifies anger and impedes anger relief (Denson, et al., 2012). Therefore, people who are likely to ruminate anger would feel more anger even after some time than those who are not, even if time has passed. Furthermore, it was predicted that the perception of others' hostile intent would mediate the relationship between anger rumination traits and the intensity of anger.

Anger Rumination Trait and Motivation for Retaliation

Some studies indicate that anger rumination facilitates aggressive behavior (e.g., Rusting & Nolen-Hoeksema, 1998; Bushman, 2002; Denson, Pedersen, Friese, Hahm, & Roberts, 2011; Pedersen et al., 2011). Furthermore, Bushman et al. (2005) found that participants in a rumination group were more aggressive eight hours after rumination than in the no-rumination control group. Therefore, people who are likely to ruminate may be more motivated to retaliate because anger rumination involves the thought of revenge (Sukhodolsky et al., 2001).

As an exploratory study, we examined the processes underlying the anger rumination trait that may influence motivation for retaliation. In the multiple system model of anger rumination proposed

by Denson (2012), anger rumination, which differs in content and cognitive processes, may influence the intensity and maintenance of anger, and anger facilitates aggressive behavior by depleting self-regulation. Pedersen et al. (2011) found that anger mediated experimentally manipulated anger rumination and displaced aggression. Conversely, another study found that anger does not mediate aggressive behavior (Denson et al., 2011).

A relationship between perceptions of others' intent and motivation for retaliation has also been found (Epstein & Taylor, 1967; Greenwell & Dengerink, 1973; Dodge, 1980; Ferguson & Rule, 1983). Perceptions of others' hostile intent also influence aggression (Anderson & Bushman, 2002). Bushman et al. (2005) found that the evaluation of others' intentions was mediated by a triggering event in the rumination condition. However, the link between anger rumination traits, perception of others' intent, and aggressive behavior has not been found. Thus, it seems that the motivation for retaliation would be facilitated not only by anger and anger rumination traits, but also by the perception of the others' intent.

In summary, it is predicted that people who are likely to experience anger rumination would feel more anger (Hypothesis 1), perceive others' intent more negatively (Hypothesis 2), and be more highly motivated to retaliate (Hypothesis 3) than people who do not experience anger rumination. Furthermore, we examined how anger rumination interferes with the mitigation of anger and how this influences motivation for retaliation.

Method

Participants and Procedure

The participants were 177 Japanese college students (68 men and 109 women) who provided their written consent to participate in the study. They completed the ARS scale and were asked to recall an episode in which they experienced the most anger in the last month and to briefly write about the content of the episode. They also answered ques-

tions about the intensity of anger and perception of the others' intent during the event that caused anger.

Questionnaire

The questionnaire asked for a brief description of the episode that caused the most anger and included items about the intensity of anger, perception of the others' intent, and motivation for retaliation. Additional items in the questionnaire unrelated to the study were excluded. This study was approved by the ethics committees of the Gifu University of Medical Science (approval number: 7) and Aichi Gakuin University (approval number: 1201).

Anger, Others' Intent, and Motivation for Retaliation

In this study, participants were asked to retrospectively rate the intensity of anger immediately after, the next day, and a week after the event on a 0-100 scale (e.g., "How intense was the anger right after the event?" and "How intense was the anger a week after the event?"). To measure the perception of the others' intent, participants retrospectively rated those perceptions immediately after, the next day, and a week after the anger event (e.g., "Rate how intentional the person who caused the anger was" etc.) on a 6-point Likert-scale ranging from "Not at all (1)" to "Extremely intentional (6)". To measure motivation for retaliation, participants answered the question "Do you want to retaliate?" and "Do you want to punish another person?" on a 6-point Likert scale ranging from "Not at all (1)" to "Very likely (6)". The motivation for retaliation was measured only once in a separate section because the main purpose of this study was to reveal the influence of anger rumination on the change of anger and perception of others' intent. The means of the items were used in the analysis.

Anger Rumination Scale

The Anger Rumination Scale (ARS) was developed by Sukhodolsky et al. (2001) to measure the tendency to focus attention on angry moods, recall past anger episodes, and consider causes and consequences. The ARS consists of 19 items that contain

the angry afterthoughts (e.g., “I re-enact the anger episode in my mind after it has happened.”), the thoughts of revenge (e.g., “I have long living fantasies of revenge after the conflict is over.”), the angry memories (e.g., “I keep thinking about events that angered me for a long time.”) and the understanding of causes (e.g., “I think about the reasons people treat me badly.”) subscales. The items were rated on a 4-point Likert scale ranging from “Almost never (1)” to “Almost always (4)”.

The Japanese version of the ARS consists of three factors: “reflection on anger events” “memory of anger episodes” and “thoughts of revenge” (Hatta, Ohbuchi, & Hatta, 2013). The first factor, reflection on anger events, consists of all the items from the understanding of causes and three items from the angry afterthoughts subscale in the original ARS in addition to reflection on angry mood and thinking about the anger episode. The second factor, memory of anger episode, consists of four items from the angry memories subscale and two items from the angry afterthoughts subscale. This factor reflects the tendency to recall past episodes of anger. The third factor (“thoughts of revenge”) consists of four items from the original ARS. This factor reflects one’s thinking and fantasizing about retaliation. The remaining two of the 19 items in the Japanese ARS did not yield more than .40 on these factors, but the sum of 19 items as the score of the Japanese ARS was used in this analysis. It was found that both the Japanese ARS and the original ARS had adequate test-retest reliability and internal consistency.

The experimental variable was the anger rumination trait (ART) consisting of two conditions: high ART and low ART. Participants in the highest quartile of the ARS scores were placed in the high ART condition ($n = 42$), whereas those in the lowest quartile of the ARS scores were placed in the low ART condition ($n = 51$).

Results

Greenhouse-Geisser corrections as necessary

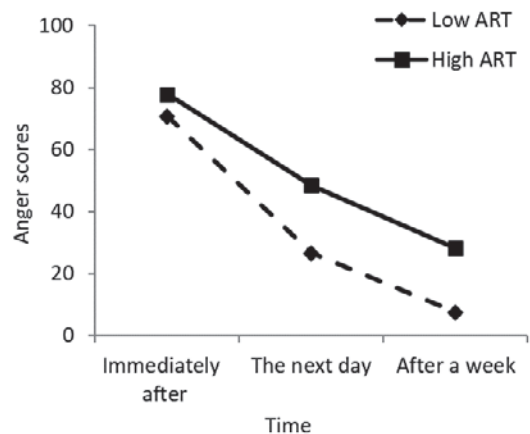


Figure 1 The interaction effect of ART \times Time on Anger

were applied in the ANOVA.

Anger Rumination Trait and Anger

An ANOVA with the ART scores (high ART and low ART) as a between-subjects variable and the Time (the time points of immediately after, the next day, and after a week from the anger event) as a within-subjects variable was conducted. The main effect of the anger rumination trait on the intensity of anger was significant ($F(1, 91) = 16.01, p < .01, \eta^2 = .15$); participants in the high ART condition felt more anger than those in the low ART condition. The main effect of Time on intensity of anger was significant ($F(1.72, 156.68) = 173.93, p < .01, \eta^2 = .66$). The participants felt the most anger immediately after the anger episode among all conditions, and felt more anger the next day than after a week (all $ps < .01$). Furthermore, the interaction between ART and Time at which anger was felt was significant ($F(1.72, 156.68) = 3.65, p < .05, \eta^2 = .04$). As shown in Figure 1, the participants in the high ART condition felt more anger the next day and after a week than those in the low ART condition ($ps < .05$), but no significant difference in anger immediately after ART was shown.

Anger Rumination Trait and Perception of Others' Intent

An ANOVA using ART (High ART and low ART) as a between-subjects variable and time (im-

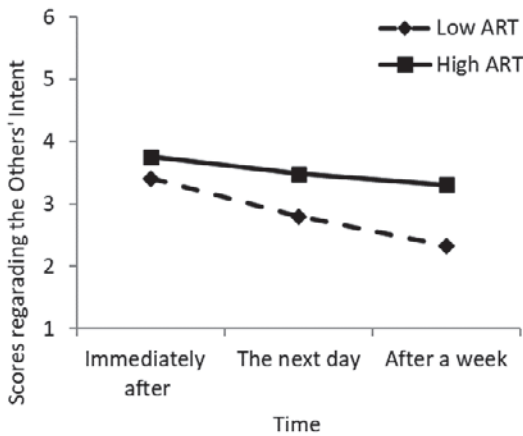


Figure 2 The interaction effect of ART × Time on perception of others' intent

mediately t after, the next day, and after a week) as a within-subjects variable was conducted to measure the perception of the others' intent. Regarding the main effect of ART on the perception of the others' intent ($F(1, 91) = 3.85, p = .053$), the participants in the high ART condition perceived the others' behaviors as more intense in the anger episode than those in the low ART condition. The main effect of time on the intensity of the perception of intent was significant ($F(1.47, 133.99) = 23.43, p < .01, \eta^2 = .21$). The participants perceived the others' intent most strongly immediately after the anger experience among all conditions and perceived the others' intent the next day more strongly than after a week (all $ps < .01$).

The interaction effect of ART × Time on the perception of the others' intent was significant ($F(1.47, 133.99) = 3.88, p < .05, \eta^2 = .04$). As shown in Figure 2, the participants in the high ART condition perceived that the other was more likely to cause harm than those in the low ART condition on both the next day ($p = .06$) and after a week ($p < .01$) conditions but not at the immediately after condition. Furthermore, while significant differences existed between the three conditions (all $ps < .05$) in the low ART group, a marginally significant difference was demonstrated only between the period immediately after the incident and the period after a week of the

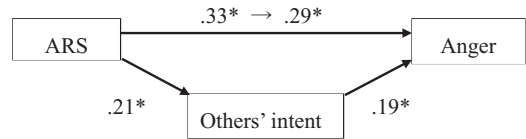


Figure 3 Others' intent partially mediates the effect of anger rumination trait on anger
Note: * $p < .05$

incident in the high ART condition ($p = .09$).

Mediation Analysis

A causal mediation analysis (Baron and Kenny, 1986) was conducted using the total score of ARS to determine whether the effects of ARS on anger after a week were mediated by the others' intent. The subjects of analysis using ANOVA were participants who were in the highest and lowest quartiles of ARS scores to vividly indicate the effect of anger rumination. In the mediation analysis, however, all participants were covered because the anger rumination trait score could be used directly as a continuous variable. As shown in Figure 3, mediation analysis using the bootstrapping method (resampling = 2000) with bias-corrected confidence intervals (CI) was conducted. The results indicated that the others' intent partially mediated the effect of the total score of ARS on anger after a week (95% CI: .02 to .22).

Anger Rumination Trait and Motivation for Retaliation

An unpaired t-test was conducted between the high- and low-ART conditions, with a score of motivation for retaliation. Participants in the high ART condition were more likely to be motivated for retaliation than those in the low ART condition ($t(91) = 5.01, p < .01, d = 1.03; M = 3.61$ vs. 2.13).

To verify which factors of anger, perception of others' intent, and subscales of ARS would relate to the motivation for retaliation, correlation analyses were conducted. The reason subscales were used was because the ARS contained thoughts of revenge reflected thinking and fantasizing about retaliation. As shown in Table 1, motivation for retali-

Table 1 Correlation coefficients between motivation for retaliation and the scores of anger and perception for each time and ARS

	Motivation for retaliation	Reflection	ARS Anger memory	Thought of revenge
Anger				
Immediately after	.34**	.11	.13	.10
Next day	.19**	.31**	.31**	.09
After a week	.25**	.34**	.33**	.23**
Others' intent				
Immediately after	.22**	.09	.11	.06
Next day	.28**	.14	.15*	.09
After a week	.33**	.18*	.21**	.18*
ARS				
Reflection	.26**		.75**	.55**
Anger memory	.30**			.68**
Thought of revenge	.38**			

* $p < .05$, ** $p < .01$ **Table 2** Regression analyses with the motivation for retaliation as dependent variable, anger and other's intent for each time and ARS as independent variables

	Immediately after	Next day	After a week
ARS			
Reflection	.04	.03	.02
Anger memory	-.01	-.03	-.02
Thought of revenge	.33**	.36**	.31**
Anger			
	.28**	.09	.12
Others' intent			
	.15*	.22**	.24**
R^2	.26	.22	.23

* $p < .05$, ** $p < .01$

ation was significantly correlated with all factors. Tests on the differences in correlation coefficients were conducted. In terms of anger and perception of others' intent, there were no statistically significant differences in the correlation coefficient between motivation for retaliation and each of the three points of time (immediately after, after the next day, and after a week). Furthermore, there were no statistically significant differences in the correlation coefficient between motivation for retaliation and the subscales of ARS.

Although the motivation for retaliation was measured only once from a comprehensive perspective, multiple regression analyses with the motive for re-

taliation as the dependent variable and the scores of the ARS, perception of others' intent, and the intensity of anger after a week as independent variables for each time were performed. The subjects for this analysis were also all participants, because the score of anger rumination trait could be used directly as a continuous variable. As shown in Table 2, the standard partial regression coefficients of anger and thoughts of revenge were significant immediately after the anger event, whereas the coefficients of perception of others' intent and thoughts of revenge were significant, but the coefficient of anger was not significant after a week of the anger event.

Discussion

In the current study, the influence of anger rumination on the maintenance of anger and perception of others' intentions, was examined. The results indicated that anger was more intense immediately after the event than the next day, and after a week, anger gradually mitigated as time passed. However, the participants who had a strong tendency to ruminate felt more anger than those who had a lower tendency to ruminate, except in the immediately after condition (consistent with Hypothesis 1). These results suggest that anger rumination interferes with the mitigation of anger. Anger rumination exacerbates anger (Bushman, 2002; Rusting & Nolen-Hoeksema, 1998), but for most people, it is mitigated over time. Therefore, the anger rumination trait delays the mitigation of anger in the long term, as anger gradually diminishes in most individuals.

Anger rumination was also found to influence one's perception of others' intent. Although there was no difference in the perception of the others' intent between those with either ART condition in the period immediately after the incident, participants who had a strong tendency to ruminate perceived others as making mistakes more intentionally than participants who had a lower tendency to ruminate after a week (partially consistent with Hypothesis 2). Furthermore, participants who had a lower tendency to ruminate gradually reduced their perception that the other behaved intentionally over time, but there was almost no variation about the others' intent in the participants who had a high tendency to ruminate. These results suggest that anger rumination prolongs anger and the perception that others' actions are intentional.

Furthermore, the influence of anger rumination on the intensity of anger was mediated by the perception of the others' intent a week after the event. Because the anger rumination trait consists of rethinking and understanding the cause of an event (Sukhodolsky et al., 2001), anger rumination can influence the perception of anger over time. Percep-

tion of others' intent is an especially critical factor that causes anger (Averill, 1983; Ferguson & Rule, 1984). Therefore, anger rumination influences the cognitive process underlying the perception of others' intent, and such processes involve a delayed effect of the anger rumination trait on the mitigation of anger.

The results of the present study indicated that participants who had a strong tendency to ruminate were more motivated to retaliate than those who had a lower tendency to ruminate (consistent with Hypothesis 3). Since the ARS involves thoughts of revenge as a subscale (Sukhodolsky et al., 2001), people who had a strong tendency to ruminate would likely want to retaliate because they might frequently imagine revenge. The results of this study corroborate findings that ruminating about anger following provocation facilitates aggressive behavior (Bushman, et al., 2005; Pedersen, et al., 2011).

To examine factors that influence the motivation for retaliation at three different times, correlation analyses were conducted using scores of anger, perception of others' intent, motivation for retaliation, and ARS as variables. The results indicated that motivation for retaliation correlated significantly with all factors at all time phases. In particular, the correlation coefficient between motivation for retaliation and anger immediately after was the largest among the three times. The correlation coefficient between motivation for retaliation and perception of others' intent one week later was the largest among the three times, although the differences in correlation coefficient scores were not statistically significant. The results of multiple regression analyses indicated that the ARS scores and perception of others' intent after a week significantly predicted the motivation for retaliation, but anger did not. This suggests the possibility that anger influences the motivation for retaliation for a short period, whereas the perception of others' intent influences it over a long period.

These results are inconsistent with the multiple

systems model that proposes, anger rumination causes aggressive behavior by mediating anger. The cause of this inconsistency may be that this study did not measure actual aggressive behavior but the motivation one has for retaliation after an anger incident. The amplified anger affect might be necessary to reflect motivation for retaliation in aggressive behavior. Additionally, the effects of the anger rumination trait in the long term were examined, whereas the findings from previous studies examined the effect of ruminating anger in the short term. The effect of anger rumination may differ depending on whether it is a trait or state, and whether it is measured in the short or long term.

The correlation coefficient between motivation for retaliation and thought of revenge was the largest of subscales of ARS, but there were not significant differences. In this study, the thought of revenge of ARS represented a relatively stable individual trait, whereas motivation for retaliation represented a motivated state to retaliate. Surely, the thought of revenge of ARS influences motivation for retaliation, but the effect is not extremely strong and cannot be explained only by the thought of revenge.

Limitations and Future Directions

There are several limitations of the current study. First, participants retrospectively responded about the intensity of anger and perception of others' intent at each point in time. Self-reports can be biased responses because participants remember experiences differently over time. In future studies, anger and perceptions caused by anger rumination should be measured in real time using a diary method. Another limitation is that the type of event that caused anger was not controlled. Therefore, future research is needed to examine the long-term effects of anger rumination by creating different types of anger-causing events in the laboratory.

Finally, although the results suggest that the anger rumination trait might prompt aggressive behavior, actual aggressive behavior was not measured. In future studies, the influence of anger rumi-

nation on aggressive behavior should be examined. According to research on aggression, there are various types of aggressive behaviors, such as impulsive or thoughtful (Anderson and Bushman, 2002) and proactive or reactive aggression (Poulin & Boivin, 2000). It is important to examine the type of aggressive behavior, so that the relationship between the anger rumination trait and specific aggressive behaviors may be investigated.

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