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Creativity under the gun

How threat features and personal characteristics motivate creative responding

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CHAPTER 5

Imminent Threat and the Selection of Creative Responses:

The Mediating Role of Perceived Effectiveness

Everyday life requires people to effectively deal with various situations, sometimes even life-threatening situations, such as a crime, an accident, or a fire. While these threatening situations can have serious personal consequences, they are of low probability and thus confront the individual with a novel problem (Marks & Nesse, 1994; Gohm, Baumann, & Sniezek, 2001). To successfully diminish or avert the negative consequences of such novel problems, people often respond with useful yet uncommon solutions (Runco & Jaeger, 2012). Indeed, experiments have shown that people are able to generate creative ideas when confronted with threats. For example, when individuals anticipated a competitive interaction with a hostile opponent, they generated more original conflict tactics than when they anticipated a cooperative interaction (De Dreu & Nijstad, 2008).

This earlier work on the threat-creativity link did not look at whether and when people not only *generate* original solutions but also *select* the most promising one for actual implementation. This is a non-trivial issue for three reasons. First, whereas creativity is usually operationalized as ideas that are both original and useful (Runco & Jaeger, 2012), past work identified an inverse relation between originality and usefulness (Runco & Charles, 1993). Thus, although people benefit most from useful *and* original responses, they may have difficulty identifying and selecting truly creative responses. Therefore, when it comes to responding to threat, people may prefer useful but unoriginal ideas (cf. Mueller, Melwani, & Goncalo, 2012). Second, idea generation and idea selection are distinct processes. Idea generation is a divergent phase that involves the production of alternative responses, whereas idea selection is a convergent phase that involves a quality assessment and actual decision-making (Cropley, 2006; Kohn, Paulus, & Choi, 2011; Runco, 2008). Indeed, generating creative ideas not necessarily associates with selecting good ideas; selection performance rarely exceeds chance level (Faure, 2004; Rietzschel, Nijstad, & Stroebe, 2014). Finally, situational factors that influence idea generation may have a different impact on idea selection (Rietzschel et al., 2014; Ritter, van Baaren, & Dijksterhuis, 2012). With these points in mind, the purpose of the present study is to examine whether, when and how imminent threats influence the selection of creative threat responding.

Motivated Creativity under Imminent Threats

When coping with problematic situations, *useful* responses are obviously required (Amabile, 1996; Humphries & Driver, 1967, 1970; Runco & Jaeger, 2012). However, individuals may benefit most from useful responses that are also *original* (i.e. creative responses): these responses may provide new ways to solve problems (Sternberg & Lubart,

1991). Research on animals' defensive behaviors shows that when facing imminent threats, animals respond in novel and erratic ways, such as zigzagging and wild bouncing. These unpredictable responses have great survival value because they confuse predators and delay predators' reactions, thereby winning precious time for prey animals to escape (Humphries & Driver, 1967, 1970).

In response to threatening circumstances, people may favor usefulness over originality because they hold a bias against originality under such uncertain circumstances (Mueller et al., 2012). Likewise, earlier work indicates that compared to common and practical ideas, novel ideas are usually not preferred and selected for future implementation, because people actively avoid potential risk (Mumford, Blair, Dailey, Leritz, & Osburn, 2006). Accordingly, we predict that people under threat tend to select useful rather than original responses (Hypothesis 1).

However, as argued before, people benefit most from the selection of responses that are both useful *and* original when dealing with threatening circumstances. According to the motivated focus account of creativity (De Dreu & Nijstad, 2008), threats increase people's motivation to cope with the threatening situation. This heightened motivation drives people to mobilize cognitive resources to attend to and process threat-relevant information (Elliot, 2008; Reinecke, Becker, & Rinck, 2009) and search for the most effective way to solve the problem at hand. Accordingly, threats may improve people's creativity when their creativity helps them to deal with the threat at hand (De Dreu & Nijstad, 2008). For example, people may come up with creative ways to deceive opponents during conflictive negotiations (De Dreu & Nijstad, 2008). Because novel responses provide additional adaptive value in effective threat-regulation (cf. Humphries & Driver, 1967, 1970), people may appraise responses that are both original and useful as being particularly effective to deal with threatening circumstances and will thus be more likely to select creative responses for ultimate implementation.

If, as we propose, the degree of motivation steers the selection of creative threat responses, we would expect that creative threat-responding will be influenced by two threat features: whether the threat is directed toward the observer and the available time to make a choice. The direction of threat signals whether the observer is the target of the threat and modulates their evaluation of the situation. Previous work shows that compared to threats (e.g., snakes, guns, angry faces) directed away from the observer, those directed towards people themselves are perceived as more imminent and self-relevant (Cheng, Baas,

De Dreu, 2016c; Flykt, Esteves, & Öhman, 2007; Kveraga et al., 2015), and thus elicit a stronger motivation to deal with the threat at hand. Accordingly, we predict that compared to people facing other-directed threats, those facing self-directed threats may appraise responses that are both original and useful as being particularly effective to deal with threatening circumstances (Hypothesis 2) and will thus be more likely to select creative responses for ultimate implementation (Hypothesis 3).

Another key feature of the threatening situation is the available time to select a response. With valuable outcomes at stake (e.g., one's life, possessions), the need to respond immediately may result in considerably experienced time pressure. Time pressure taxes cognitive resources and interferes with extensive processing that would otherwise facilitate the execution of the task (Andrews & Smith, 1996; Baumeister & Heatherton, 1996; De Dreu, 2003; Roskes, Elliot, Nijstad, & De Dreu, 2013). Thus, when it comes to the identification of useful yet original threat-responses, time pressure may interfere with the assessment of the quality of threat-responses and actual decision-making. Accordingly, we expect a detrimental effect of time pressure on creative response selection (Hypothesis 4).

Present Study

Two studies were conducted to test whether and how threat direction and time pressure influence the selection of creative threat responses. To test our predictions, we developed a binary choice task in which participants faced self-directed or other-directed threats and were asked to choose one out of two alternative threat responses that differed on either originality (low vs. high) or usefulness (low vs. high) to deal with the presented threat; participants made their choices under either high or low time pressure (Study 5.1 and 5.2). To test our predictions, we measured the preference for creative responses (responses high on both originality and usefulness). To tease apart the trade-off between usefulness and originality during selection, we additionally measured the preference for high-original and high-useful responses separately. In Study 5.2, participants additionally indicated their perceived originality, usefulness, and effectiveness of the alternative threat responses after the binary choice task. We report all measures, manipulations, exclusions, and the method of determining the sample size in the two studies.

Study 5.1

Method

Design and participants. One hundred and thirty-four participants (68% female, $M_{age} = 22.37$, $SD = 3.16$) participated for payment (€5) or course credit. The sample size was determined a priori using G*Power software (Faul, Erdfelder, Lang, & Buchner, 2007). Based on earlier work on idea generation (Cheng et al., 2016c), we calculated that to obtain a small to medium effect ($\eta_p^2 = .02$) with a mixed design would require at least one hundred participants (at power = .80, $\alpha = .05$). We recruited slightly more in the consideration of potential exclusion of participants.

Participants were randomly assigned to conditions of a 2 (time pressure: high vs. low; both $n = 67$) \times 2 (threat direction: self-directed vs. other-directed) design with the latter factor within-subjects. Dependent variables were manipulation checks and preference for creative, original, and useful threat responses. The study had ethics approval, participants signed informed consent forms, and received a debriefing upon completion of the experiment.

Procedure and manipulation. Participants were tested individually in cubicles equipped with a computer that displayed all instructions and registered all responses. Participants first provided demographic information, such as age and gender. Subsequently, they started a binary choice task with 64 trials. Participants were instructed that in each trial, they would see a picture depicting a threatening situation along with two possible responses to deal with the depicted threat. Out of the two alternative responses, they were asked to select the response that they would use when facing the depicted situation. There were eight different pictures depicting a human attack with weapons (guns, knives, glasses, or sticks³). Four of these threat pictures depicted attacks directed at the participants (self-directed threat), and the other four depicted attacks not directed at the participants (other-directed threats) (see supplementary materials). Pilot tests and earlier research has shown that self-directed and other-directed threats are equivalent in the level of threat, but self-directed threats are more arousing, personally relevant, and more strongly directed at the participant than other-directed threats (Cheng et al., 2016c).

In addition, there were eight response pairs with alternative responses that differed in the level of originality and usefulness. Pairs of responses were selected on the basis of a

³ The stimulus pictures were selected from an image set created by Kveraga et al., 2015 (for details K. Kveraga, <http://martinos.org/~kestas/affcon>), and have been pilot-tested and used in previous studies. Results of the pilot study revealed a significant effect of threat direction on personal relevance ratings, $t(52) = 4.32$, $p < .001$, with stronger personal relevance reported in the self-directed ($M=4.38$, $SD=1.72$) rather than other-directed threat condition ($M=3.45$, $SD=1.68$).

pretest in a different sample ($N = 91$). Pretest participants rated how original and useful forty-two different responses were to deal with a specific threat on 7-point scales ranging from 1(not at all) to 7(very much). Threats were presented in pictures that either depicted self-directed attacks or other-directed attacks (the same pictures as in the main study). On the basis of pretest findings, we selected eight pairs of response choices that were always different on one dimension (i.e. within a response pair, one response was low and the other was high on either originality or usefulness) and equivalent on the other dimension (i.e. within a response pair both responses were either low or high on either originality or usefulness). For example, a response pair with the responses “convince the attacker is attacking the wrong person” and “lay still on the floor” contains responses that are both high on usefulness, but the first one is high and the second one is low on originality. A response pair with the responses “distract the other’s attention” and “spit at the attacker” contains responses that are both high on originality, but the first one is high and the second one is low on usefulness. This resulted in eight different response pairs (see Table 5.1). In total, the binary choice task consisted of 64 trials (crossing eight different pictures with eight different response pairs).

Table 5.1.

Response pairs that allowed for originality (upper panel) and usefulness comparisons (lower panel).

Originality Comparison		
	low usefulness & low originality	low usefulness & high originality
Pair 1	fight	seduce the attacker
Pair 2	make yourself big	display erratic behavior
	high usefulness & high originality	high usefulness & low originality
Pair 3	convince the attacker is attacking the wrong person	lay still on the floor
Pair 4	show understanding	talk to the attacker
Usefulness Comparison		
	low usefulness & low originality	high usefulness & low originality
Pair 5	think about a solution	stay vigilant
Pair 6	intimidate	find a weapon to defend yourself
	high usefulness & high originality	low usefulness & high originality
Pair 7	distract the attacker's attention	spit at the attacker
Pair 8	apply psychological interview techniques	disguise yourself

Participants in the main study completed the binary choice task with blocks consisting of only self-directed or other-directed threats with the order of blocks counterbalanced. The two alternatives of each response pair were either positioned left or right, with position counter-balanced across trials. We manipulated time pressure: For each trial, half of the participants were asked to make their decision within 7 seconds (high time pressure); the other half first had a “thinking period” of 10 seconds during which they saw the threatening picture along with a pair of alternative responses, after which they had 7 seconds to make their choice (low time pressure). In both conditions, the time available for making a choice was indicated by a timer. If participants did not make their choice within the allotted time, we recorded a miss for this trial. Following the binary choice task, participants completed manipulation checks.

Dependent variables. We assessed participants’ perceived time pressure by asking participants to what extent they experienced time pressure and to what extent they felt they had plenty of time to make their choices (reverse scored) on a 1 (strongly disagree) to

7 (strongly agree) Likert scale (Cronbach's $\alpha = .68$). From the choices participants made, we extracted three variables: preference for originality, preference for usefulness, and preference for creative responses. Preference for originality was calculated as the percentage of high-original responses chosen from the response pairs that contained a high- and low-original response (and were thus equivalent on usefulness). Not every participant made their choice within the allotted limit, with the percentage of missed choices varying from 0% to 8% in high time pressure condition, and from 0% to 3% in low time pressure condition. Therefore, for each participant, we always divided the number of selected high-original responses by the number of completed decisions for high- vs. low-originality response pairs.

A similar procedure was used to compute participants' preference for usefulness: we divided the number of selected high-useful responses by the number of completed decisions for high- vs. low-usefulness response pairs. Finally, we extracted the variable preference for creative responses, namely, the preference for threat responses that score high on both originality and usefulness. Out of eight possible response pairs, four contained responses that were both high in originality and usefulness (see Table 5.1). To get an index of preference for creativity, we divided the number of selected creative responses by the number of completed decisions for high- vs. low-quality response pairs.

Results

Manipulation check. A t -test confirmed that our manipulation of time pressure was successful. Participants reported more time pressure in the high ($M = 3.96$, $SD = 1.67$) than in the low time pressure condition ($M = 2.11$, $SD = 1.16$), $t(132) = 7.40$, $p < .001$.

Overall preference. Next, we examined people's preference for either usefulness or originality when dealing with assaults from other humans. A paired samples t -test revealed a significant difference between overall preference for originality and usefulness, $t(133) = -9.78$, $p < .001$, with a stronger preference for high-useful ($M = 0.73$, $SD = 0.13$) than for high-original responses ($M = 0.53$, $SD = 0.16$). Thus, supporting Hypothesis 1, when dealing with assaults from other humans, usefulness weighs more heavily than originality.

Preference for creativity. To test the effect of time pressure and threat direction on preference for creative responses (i.e. responses that are both original and useful), we submitted the preference for creativity to a 2 (time pressure: high vs. low) \times 2 (direction of threat: self-directed vs. other-directed threat) repeated measure ANOVA with the latter

factor within-subjects. We found a significant main effect of threat direction, $F(1, 132) = 8.34, p = .005, \eta_p^2 = .06$. Participants facing self-directed threats selected creative responses ($M = 0.68, SD = 0.16$) more frequently than those facing other-directed threats ($M = 0.65, SD = 0.15$; see Figure 5.1). The main effect of time pressure, $F(1, 132) = 0.05, p = .830$, and the interaction effect between time pressure and threat direction, $F(1, 132) = 0.12, p = .733$, were not significant.

Preference for originality and usefulness. To further tease apart the effects on originality and usefulness dimensions, we submitted the preference for originality and preference for usefulness to two separate 2 (time pressure: high vs. low) \times 2 (direction of threat: self-directed vs. other-directed threat) repeated measure ANOVAs with the latter factor within-subjects. For preference for originality, the main effect of time pressure was not significant, $F(1, 132) = 0.29, p = .590$. However, we found a significant main effect of threat direction, $F(1, 132) = 10.51, p = .002, \eta_p^2 = .07$, with the high-original responses being selected more frequently under self-directed threats ($M = 0.56, SD = 0.18$) than under other-directed threats ($M = 0.51, SD = 0.18$)(see Figure 5.1). The interaction between threat direction and time pressure was not significant, $F(1, 132) = 3.55, p = .062, \eta_p^2 = .03$. We found the same pattern for preference for usefulness. The main effect of time pressure, $F(1, 132) = 0.13, p = .718$, and the interaction between threat direction and time pressure, $F(1, 132) = 3.43, p = .066, \eta_p^2 = .03$, were not significant. However, as shown in Figure 5.1, the main effect of threat direction was significant, $F(1, 132) = 4.67, p = .033, \eta_p^2 = .03$, with a slightly stronger preference for useful responses under self-directed threats ($M = 0.74, SD = 0.15$) than under other-directed threats ($M = 0.72, SD = 0.14$).

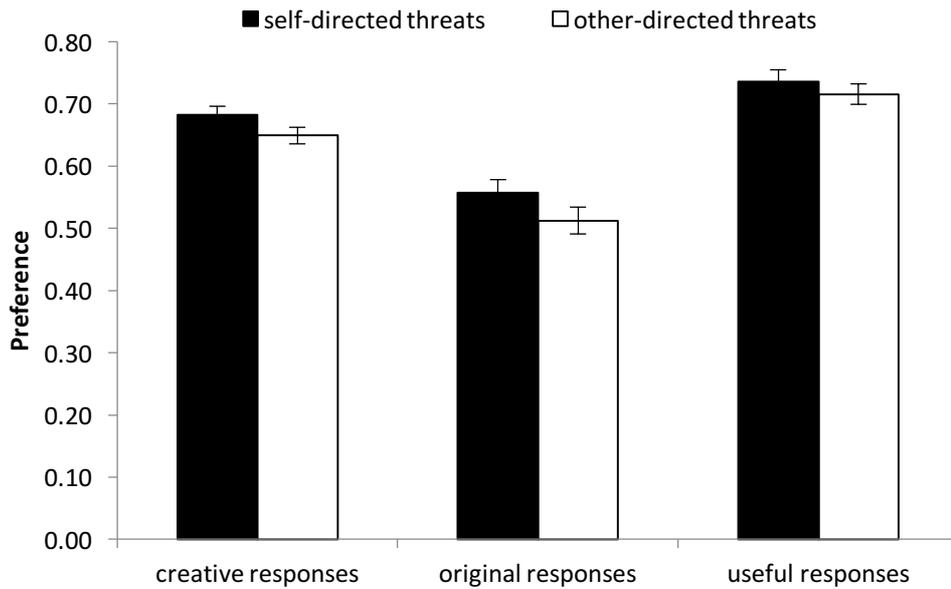


Figure 5.1. Preference for creative, original, and usefulness threat-responses as a function of threat direction (Study 5.1, reported in percentage, $M \pm SE$).

Discussion of Study 5.1

Study 5.1 shows that when dealing with a threat, people are generally more likely to select useful than original threat responses. This fits earlier work showing that people have a strong tendency to favor feasible rather than original ideas (Rietzschel, Nijstad, & Stroebe, 2010), an effect that may be exacerbated by threat exposure. Moreover, whereas time pressure did not influence the selection of threat responses, threat direction did: self-directed threats led to a stronger preference for creative threat responses, as well as for high-original and high-useful threat responses than other-directed threats. This fits the motivated focus account that people favor creative responses more when threats are imminent and personally relevant, and thus more motivating.

Study 5.2

Study 5.2 was designed to replicate Study 5.1's findings with the same manipulations and binary choice task but with threat direction as a between-subjects factor. We tested for time pressure again, to verify the null finding in Study 5.1 was robust rather than a false negative. More importantly, we extended Study 5.1 by testing whether perceived

effectiveness of threat responses mediates the relation between threat direction and response selection. If the pattern observed in Study 5.1 was indeed due to increased motivation to protect against the threat, threatened people should select the response perceived to be most effective to solve the problem at hand. Given that novel responses serve as an adaptive device against imminent attack (Humphries & Drive, 1970), we proposed that self-directed threats would lead to a stronger preference for creative responses because people under self-directed threats should perceive creative ideas as being more effective than those under other-directed threats. To investigate this possibility, we asked participants, after the binary choice task, to indicate how effective, original, and useful all alternative threat responses were in dealing with the presented threats. We used the originality and usefulness ratings of alternative responses as manipulation checks to exclude the possible variation in perceived originality and usefulness of pre-selected threat responses influences response selection.

Method

Design and participants. Participants ($N = 239$, 74.5% female, $M_{\text{age}} = 22.36$, $SD = 4.96$) were randomly assigned to conditions of a 2 (time pressure: low vs. high) \times 2 (direction of threat: self-directed vs. other-directed) between-subjects design. Based on the results in Study 5.1, we expected a medium effect size ($\eta_p^2 = .07$). Power analysis with G*Power showed the minimum sample size should be 225 with a between-subjects design (at power = .80, $\alpha = .05$). Dependent variables were manipulation checks, preference for originality, usefulness, and creativity, and perceived originality, usefulness, and effectiveness of the alternative threat responses.

Procedure, manipulation and dependent variables. The procedure, materials, and manipulations were the same as in Study 5.1, with the following exceptions. First, threat direction was manipulated between-subjects. Second, we added two pictures displaying human attacks with a gun that, depending on condition, were either self-directed or other-directed⁴, so there were six threat pictures in each threat-direction condition (three displaying a human attack with guns, the other three displaying human attacks with the close distance weapons knife, stick, and glass). Third, following manipulation checks,

⁴ The added stimulus pictures were selected from the image set used in Study 5.1 (Kverage et al., 2015). These pictures together with those ones used in Study 5.1, have been pilot-tested and used in previous studies. Results of the pilot study showed a significant effect of threat direction on personal relevance ratings, $t(52) = 5.33$, $p < .001$, with stronger personal relevance reported in the self-directed ($M=4.54$, $SD=1.65$) rather than other-directed threat condition ($M=3.53$, $SD=1.61$).

participants rated all the 16 alternative responses from the binary choice task. Participants were presented with the same threatening pictures that were presented in the binary choice task (the pictures displayed either self-directed or other-directed threats depending on condition), and rated all alternative responses, one by one, on how original (Cronbach's $\alpha = .90$), useful (Cronbach's $\alpha = .91$), and effective (Cronbach's $\alpha = .80$) they were in dealing with the presented threatening situations on 7-point Likert scales ranging from 1 (not at all) to 7 (very much). The order of the 16 responses was randomized.

The preference for originality, usefulness, and creativity was computed as in Study 5.1. Additionally, from the response pairs that contained a high- and low-original response, we computed the average originality, usefulness, and effectiveness ratings of the high and low-original responses separately. From the response pairs that contained a high- and low-useful response, we calculated the average originality, usefulness, and effectiveness ratings of the high- and low-useful responses separately.

Results

Manipulation check. To verify the effectiveness of our manipulation of time pressure, we conducted a 2 (time pressure: high vs. low) \times 2 (direction of threat: self-directed vs. other-directed threat) between-subjects factorial ANOVA with perceived time pressure as dependent variable, and found a main effect of time pressure, $F(1, 235) = 127.34, p < .001, \eta_p^2 = .35$. Participants in the high time pressure condition experienced more time pressure ($M = 3.87, SD = 1.29$) than those in the low time pressure condition ($M = 1.97, SD = 1.31$). No other effects were found, $F_s < 1.29, p_s > .25$.

We then submitted the originality ratings of high- and low-original responses to a paired sample *t*-test to verify that the originality of pre-selected high-original responses were, in fact, higher than the pre-selected low-original responses. The results showed the high-original responses were indeed perceived as more original ($M = 5.07, SD = 0.99$) than the low-original responses ($M = 3.41, SD = 1.01$), $t(238) = 22.44, p < .001$, Cohen's $d = 1.46$. Likewise, a paired sample *t*-test comparing usefulness ratings of preselected high and low-useful responses showed that high-useful responses were perceived as more useful ($M = 4.54, SD = 0.85$) than low-useful responses, ($M = 4.11, SD = 0.94$), $t(238) = 8.52, p < .001$, Cohen's $d = 0.54$.

Descriptive statistics. Table 5.2 shows means and standard deviations, along with zero-order correlations for all variables included in Study 5.2. Preference for originality

associated negatively with preference for usefulness. Furthermore, preference for creative threat responses associated positively with preference for originality and preference for usefulness, but the association with preference for originality was stronger ($r = .51, p < .001$) than the association with preference for usefulness ($r = .13, p = .048$). In addition, preference for creative threat responses was more strongly associated with effectiveness ratings of high-original responses ($r = .34, p < .001$) than with effectiveness ratings of high-useful responses ($r = .16, p = .015$). Finally, effectiveness ratings of high-original responses associated positively with preference for originality.

Table 5.2.

Means, standard deviations, and correlations (Study 5.2, N = 239).

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1 Preference for originality	0.48	0.20								
2 Preference for usefulness	0.76	0.13	-.20**							
3 Preference for creativity	0.67	0.14	.51***	.13*						
4 Originality ratings of high- original responses	5.07	0.99	.10	-.01	.08					
5 Originality ratings of high- useful responses	3.90	0.98	.10	-.04	.01	.10				
6 Usefulness ratings of high-original responses	4.21	0.89	-.01	.01	.02	-.05	-.01			
7 Usefulness ratings of high-useful responses	4.54	0.85	-.09	.02	-.003	-.05	-.05	.74***		
8 Effectiveness ratings of high-original responses	3.72	0.91	.36***	-.04	.34***	.02	.04	-.01	.04	
9 Effectiveness ratings of high-useful responses	4.66	0.78	-.02	.04	.16*	.11	-.04	.37***	.50***	.15*

Note. *N* = 239.

p* < 0.05, ** *p* < 0.01, **p* < 0.001

Overall preference. We first examined people's preference for either usefulness or originality when dealing with assaults from other humans. Preference for originality and preference for usefulness were submitted to a paired samples *t*-test. The analysis revealed a significant difference between the overall preference for originality and usefulness, $t(238) = -16.90, p < .001$. Similar to Study 5.1's findings, preference for usefulness ($M = 0.76, SD = 0.13$) was higher than preference for originality ($M = 0.48, SD = 0.20$).

Preference for creativity. To test the effect of time pressure and threat direction on preference for creative responses, we submitted the preference for creativity to a 2 (time pressure: high vs. low) \times 2 (direction of threat: self-directed vs. other-directed threat) between-subjects factorial ANOVA. Consistent with the results in Study 5.1, we found a significant main effect of threat direction, $F(1, 235) = 12.38, p = .001, \eta_p^2 = .05$. Participants facing self-directed threats selected the creative responses ($M = 0.70, SD = 0.15$) more frequently than those facing other-directed threats ($M = 0.63, SD = 0.12$). The main effect of time pressure, $F(1, 235) = 1.02, p = .314$, and the interaction effect between time pressure and threat direction, $F(1, 235) = 0.21, p = .646$, were not significant.

Preference for originality and usefulness. We then submitted the preference for originality and usefulness to two separate 2 (time pressure: high vs. low) \times 2 (direction of threat: self-directed vs. other-directed threat) between-subjects factorial ANOVAs. For the preference for originality, the main effect of threat direction was not significant, $F(1,235) = 1.78, p = .184$, although means were in the expected direction. Moreover, there was no significant main effect of time pressure, $F(1,235) = 2.31, p = .130$, nor an interaction between threat direction and time pressure, $F(1,235) = 0.09, p = .770$. For the preference for usefulness, the main and interactions effects involving time pressure and threat direction were not significant, $F_s < 0.93, p_s > .337$.

Mediation analyses: Effectiveness ratings as potential mediators. To tested our hypothesis that compared to other-directed threats, self-directed threats would increase people's preference for creative threat responses because they are seen as more effective in dealing with the threat at hand, we ran a "multiple mediator model" to test whether threat direction influences preference for creative responses through its influence on effectiveness ratings of either the high-original or high-useful responses, or perhaps both. We bootstrapped the indirect effects of threat direction on preference for creative responses through both potential mediators ($N_{boot} = 5,000$). As expected, threat direction influenced preference for creative responses indirectly through its effect on effectiveness

ratings of high-original responses (*unstandardized indirect effect* = 0.02, $SE_{boot} = 0.01$, 95% CI = 0.007, 0.031). As can be seen in Figure 5.2A, participants in the self-directed threat condition rated high-original responses as being more effective to deal with the threat at hand than those in the other-directed threat condition ($B = 0.37$, $SE = 0.12$, $p = .001$), and the higher effectiveness ratings of the high-original responses led to an increased preference for creative responses ($B = 0.05$, $SE = 0.01$, $p < .001$). However, there was no evidence that threat direction affected preference for creativity through its effect on effectiveness ratings of high-useful responses (*unstandardized direct effect* = 0.002, $SE_{boot} = 0.003$, 95% CI = -0.001, 0.011).

Moreover, although we did not find a significant main effect of threat direction on preference for high-original responses in this study, contemporary approaches to mediation analysis suggest that lack of such a significant direct effect does not preclude testing for indirect effects (Aguinis, Edwards, & Bradley, 2016; Hayes, 2009; Rucker, Preacher, Tormala, & Petty, 2011). Therefore, we explored the possibility that threat direction (self-directed threat = 1, other-directed threat = 0) exerts an effect on preference for originality indirectly through the effectiveness ratings of high-original responses by using a bootstrapping procedure (Preacher & Hayes, 2008). The results showed that threat direction indeed influenced preference for originality indirectly through its effect on effectiveness ratings of high-original responses. As can be seen in Figure 5.2B, participants in the self-directed threat condition perceived the high-original responses as being more effective in dealing with the presented threats than those in the other-directed threat condition ($B = 0.37$, $SE = 0.12$, $p = .001$), and effectiveness ratings of high-original responses positively predicted the preference for high-original threat responses ($B = 0.08$, $SE = 0.01$, $p < .001$). The indirect effect was significant based on 5,000 bootstrap samples (*unstandardized indirect effect* = 0.03, $SE_{boot} = 0.01$, 95% CI = 0.012, 0.053).

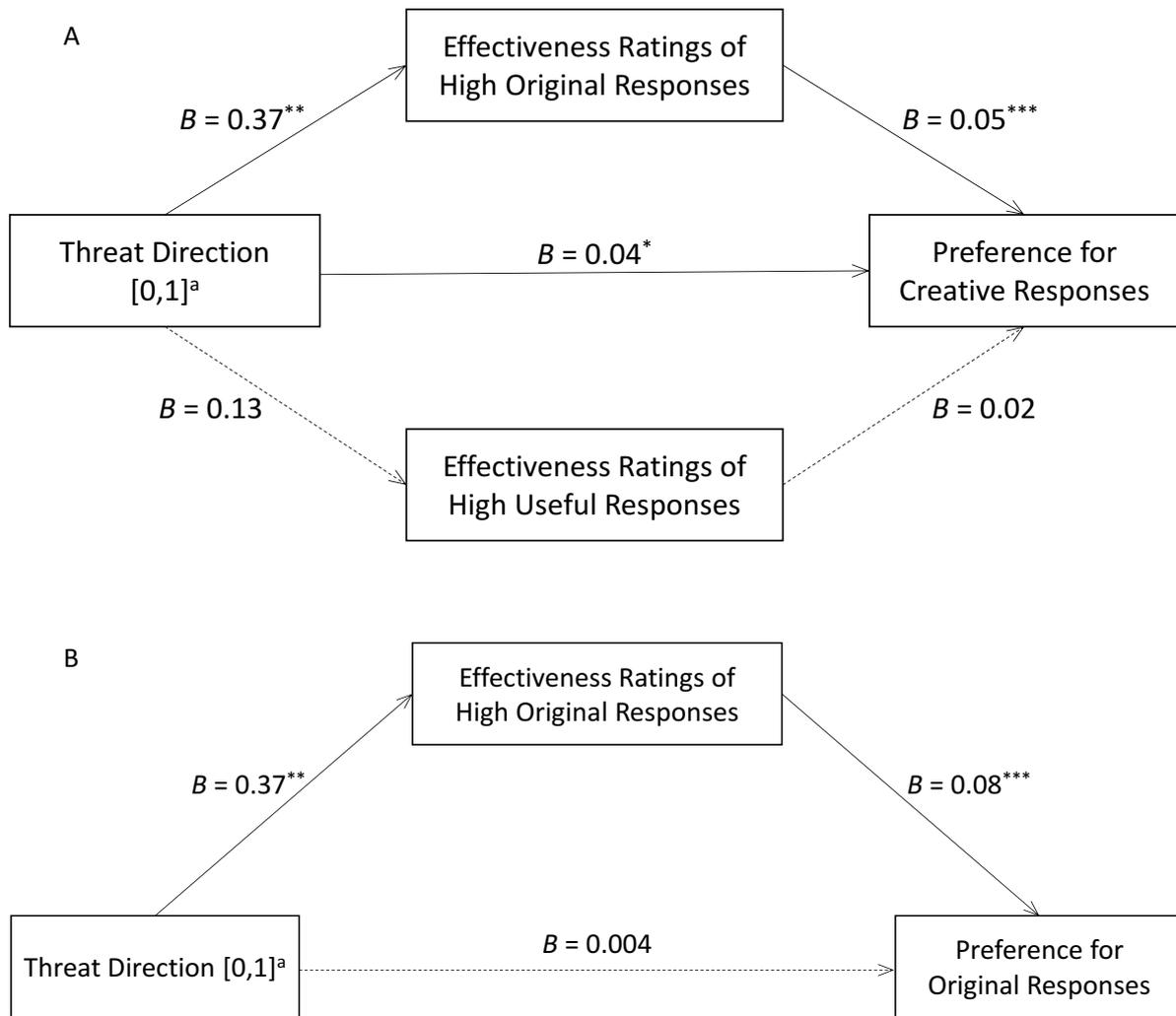


Figure 5.2. Simple mediation model for preference for original responses (Panel A) and parallel multiple mediators model for preference for creative responses (Panel B) in Study 5.2 (displayed are unstandardized coefficients for each path). Threat direction affected preference for originality indirectly through effectiveness ratings of high-original responses. Moreover, effectiveness ratings of high-original responses rather than effectiveness ratings of high-useful responses mediated of the link between threat direction and preference for creative responses.

^aSelf-directed threats = 1, other-directed threats = 0. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Meta-analysis Across Studies

Across the two studies, we consistently found a significant effect of threat direction on the preference for creative responses. However, the results for preference for originality and usefulness were not conclusive. To get a more comprehensive picture of the data, we meta-analyzed threat-direction effects from the two studies (combined $N = 373$), separately for preference for originality, usefulness, and creativity. All analyses and computations were carried out using Comprehensive Meta-Analysis software, V2 (Biostat

Version 2, 2007). We used the standardized mean difference (Hedges' g) between threat direction conditions as the effect size index for all outcomes with positive signs indicating stronger preference in the self-directed rather than other-directed threat condition. Because threat direction was manipulated within-subjects in Study 5.1 and between subjects in Study 5.2, we first calculated the size of the threat direction effect (Hedge's g) for each study; we then meta-analyzed effect sizes across studies using a random-effects model (Borenstein, Hedges, Higgins, & Rothstein, 2009). Results revealed a small effect size for preference for originality, indicating that participants in the self-directed threat condition preferred high-original responses more than those in the other-directed threat condition, Hedges' $g = 0.23$; 95%CI = 0.094, 0.358. Participants in the self-directed and other-directed threat conditions did not differ in their preference for usefulness, Hedges' $g = 0.06$; 95%CI = -0.149, 0.263. Finally, we found a small to moderate effect size for the preference for creative responses, with participants in the self-directed threat condition showing a stronger preference for creative responses than those in the other-directed threat condition, Hedges' $g = 0.31$; 95%CI = 0.081, 0.538.

Discussion

The aim of the current study was to examine whether and how imminent threats influence the selection of creative threat-responses. Consistent with previous work that shows that people have a general bias against originality relative to practicality (Mueller et al., 2012; Rietzschel et al., 2010), our results revealed that regardless of threat direction and time pressure, people generally prefer useful responses to original responses. This effect may be exacerbated when dealing with threatening situations. Moreover, we found that people under self-directed threats favor creative and high-original responses more than those under other-directed threats, and this effect is due to the fact that people under self- rather than other-directed threats perceived high-original responses to be more effective in dealing with the threat at hand; threat direction did not influence the preference for high-useful responses. Lastly, we did not find a significant effect of time pressure on the selection of threat responses in the present study. Overall, whereas people have a strong tendency of favoring useful rather than original responses when confronted with threats, we observed an enhanced preference for creative responses under more imminent and personally relevant threats, and identified that it is the perceived effectiveness of original responses that mediates the relation between threat direction and

the selection of creative responses.

Imminent Threats, Perceived Effectiveness, and Responses Selection

The motivated focus account of creativity suggests that threats motivate people to mobilize and focus their cognitive resources on coping with the faced threats. Because creativity serves the adaptive purpose of coping with the present threats, this motivated focus should ultimately lead to creative responding to regulate the threat at hand (De Dreu & Nijstad, 2008). Accordingly, we predicted that compared to low-imminent threats, high-imminent threats would increase people's preference for creative responses due to the heightened motivation to resolve the threatening situations. Our results regarding threat direction are in line with this perspective: people facing self-directed threats that signal higher imminence and self-relevance favor creative responses more than those facing other-directed threats.

Previous work supporting the idea of motivated creativity focused on idea generation and, for example, had participants generate possible uses of a brick while they were expecting a conflict (De Dreu & Nijstad, 2008), or generate defensive tactics while facing pictures with violent conspecifics (Cheng, Baas, & De Dreu, 2016b). Although generating many defensive responses is important, the selection process ultimately determines which response is selected to deal with the threat. Therefore, our study extends previous work by testing the impact of imminent threats in people's selection of defensive responses and providing the first evidence that the idea of threat-relevant creativity through motivated focus pertains not only to idea generation but also to idea selection.

Furthermore, we took an initial step to probe the mechanisms underlying the relation between imminent threats and the selection of creative threat-responses. Findings from Study 5.2 show that threat direction steers creative response selection because it influences the evaluation of the effectiveness of the given responses. People facing self- rather than other-directed threats perceived high-original responses to be more effective in dealing with the threat at hand; in turn, they selected the high-original and creative responses more often. In other words, imminent threats promote the preference for creative threat-responses when creativity is seen as effective to minimize danger and regain safety. Based on these findings, it seems reasonable to propose that motivated focus is functional. It drives people to search for a way to better defend themselves against an attack, and the response that is appraised to be most effective in a particular situation has the highest chance of being selected. Past work in animal ecology observed that novel and

irregular behaviors serve as adaptive tools against imminent predatory attack (Humphries & Driver, 1970). Resonating with these findings, we found that in cases of more imminent and self-relevant threats, high-original responses are more valued and thus more often selected to deal with the specific situation. Moreover, although the perceived effectiveness of high-useful responses was positively associated with preference for creative responses, only the perceived effectiveness of high-original responses mediated the link between threat direction and preference for creative responses. These findings again underscore the adaptive importance of original responses in dealing with imminent threats and its role in understanding creative responding under threats.

We also set out to test the effect of time pressure on the selection of creative threat responses and, inconsistent with our prediction, found that although participants in high compared to low time pressure condition reported more time pressure, time pressure had no significant impact on the selection of creative responses. One explanation for this null finding may be the limited number of alternative responses in each trial of our binary choice task to choose from. This may have put relatively less demand on people's cognitive resources for processing information. If true, increasing the number of alternative responses to choose from would raise the cognitive load and effortful information processing. In this case, people would perhaps benefit more from having more time to evaluate and identify creative responses. Furthermore, earlier work focusing on generating threat responses discovered that people under high time pressure generated less original ideas than those under low time pressure (Cheng et al., 2016c). Therefore, the different findings between our study and this previous work indicate another possibility that idea generation and idea selection are two distinct steps in the creative process, and factors that facilitate/hinder idea generation may not necessarily influence idea selection in the same way. Future research is needed to identify which threat features facilitate both generating and selecting the creative response, thus improving people's creative responding under threats.

Conclusion

Previous research on the influence of threats on creativity focused on idea generation only and left unclear whether and how threats influence creative idea selection. Thus, the present study examined the effect of threat direction and time pressure on the selection of creative threat responses. Results show that time pressure did not influence the selection of creative threat responses, but the direction of threat did: People see high-original threat

responses as more effective in dealing with self-directed rather than other-directed threats, and in turn, creative threat responses are selected more often. In short, more imminent threats promote the preference for creative responses because original solutions are perceived as more effective in dealing with the threat at hand.