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Creative responses to imminent threats: The role of threat direction and perceived effectiveness☆

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ABSTRACT

Previous work on the threat-creativity link has mainly used paradigms in which participants had ample time to generate ideas. However, people under imminent threats have limited time to think of, and select, the single best response for actual implementation. In three studies, we examined the effect of imminent threats on the generation and selection of threat responses. Participants facing self-directed or other-directed threats were asked to select one out of two alternative responses that differed on either originality or usefulness to deal with the displayed situation (Studies 1 and 2) or think of and decide on, a fitting response themselves (Study 3). They did so under high or low time pressure (Studies 1–3) and reported their perceived effectiveness of each alternative response in managing the threats (Study 2). Participants selected and generated useful rather than original responses. Whereas time pressure did not moderate this effect, threat direction impacted the selection and generation of imminent threat responses: Self-directed rather than other-directed threats increased the selection and generation of original and creative responses because original responses were seen as more effective.

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 (Gohm, Baumann, & Sniezek, 2001; Marks & Nesse, 1994). To successfully diminish or avert the negative consequences of such novel problems, people often respond with useful yet uncommon solutions (Runco & Jaeger, 2012). For example, in warfare strategists use deceptive strategies that mislead their opponents, to combat life-threatening infections medical scientists invent new treatments, and to protect against terrorist attacks security agents think of innovative screening methods.

These examples notwithstanding, the effects of threat on creativity remain poorly understood. Whereas threats, and concomitant fear and anxiety, are typically associated with reduced creativity and conforming behaviors (Byron & Khazanchi, 2011; Griskevicius, Goldstein, Mortensen, Cialdini, & Kenrick, 2006; Mehta & Zhu, 2009), other work suggests that people are highly motivated to avoid, and cope with, threats and selectively focus their attention on relevant information that is available in the environment and stored in memory (Elliot, 2008). These motivational and cognitive processes, in turn, lead to a greater number of (creative) ideas that, crucially, pertain especially to threat-relevant domains (De Dreu & Nijstad, 2008). For instance, 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; also see Van Leeuwen & Baas, in press), and people came up with quite innovative ideas to avert the potential loss of monetary resources (Roskes, De Dreu, & Nijstad, 2012).

Without exception, the aforementioned studies assessed creativity using open-ended assessments: Research participants were given ample time to come up with as many ideas as possible, for example, to settle negotiations (De Dreu & Nijstad, 2008). Although valid and useful, ecological validity is putatively low. People under imminent threats have limited time to *think of* and *select* a single fitting response for actual implementation. In three studies, we therefore examined the effect of imminent threats on the generation and selection of threat responses. Our first goal here was to uncover when and why threatened people *select* creative responses for actual implementation. This is a non-trivial issue for three reasons. First, whereas creativity is usually

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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, whereas idea generation involves the production of alternative responses, 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 first goal of the present study is to examine when and why imminent threats influence the selection of creative threat responding. In real life, however, people under imminent threat have to think of, and decide on, a single fitting response *themselves*. Therefore, our second goal here was to uncover when imminent threats associate with self-generated creative threat-responding.

1. 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 and avoid and confront threatening circumstances (Sternberg & Lubart, 1991), for instance, to settle conflicts (De Dreu & Nijstad, 2008), avert the potential loss of monetary resources (Roskes et al., 2012), and escape hostile interpersonal encounters (Cheng, Baas, & De Dreu, 2016; Coccia, 2015).

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 threatened people 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 towards the observer and the available time to think and process the available options. 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 (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 and think of 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. Meanwhile, immediate responses are often habitual and highly accessible; people need some time to arrive at more original responses (Beaty & Silvia, 2012; Finke, Ward, & Smith, 1992; Lucas & Nordgren, 2015). Given that time pressure interferes with effortful thinking and achieving creativity often takes time, we expect a detrimental effect of time pressure on creative response selection and generation (Hypothesis 4).

Finally, dealing with time pressure consumes cognitive resources that would otherwise be available for the execution of the task (Karau & Kelly, 1992) and performance under the avoidance motivation that is typically triggered in threatening circumstances relies heavily on the recruitment and availability of cognitive resources and control (Koch, Holland, & van Knippenberg, 2008; Roskes et al., 2012; Ståhl, Van Laar, & Ellemers, 2012). Indeed, when people experience relatively stronger avoidance motivation, people's creative performance is enhanced only when time pressure is low rather than high (Nijstad, De Dreu, Rietzschel, & Baas, 2010; Roskes et al., 2013). Accordingly, we predicted an interaction effect between time pressure and threat direction on creative response selection and generation, such that when threats are self-directed (i.e. avoidance motivation is particularly strong), participants with more response time (i.e. low time pressure) will generate and, perhaps, select, more creative responses than those with little response time (i.e. high time pressure), but with weaker effects of time pressure when threats are other-directed (Hypothesis 5).

2. Present study

Three studies were conducted to test whether and why threat direction and time pressure influence the selection and generation of creative responses under imminent threat. To test our predictions regarding response selection, 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 (Studies 1 and 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 2, participants additionally indicated their perceived originality, feasibility, and effectiveness of the alternative threat responses after the binary choice task. In real life, however, people under imminent threat have to think of, and decide on, a single fitting response *themselves*. Therefore, our second goal here was to uncover when imminent threats associate with self-generated creative threat-responding. Therefore, in

Table 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

Study 3, participants facing self-directed or other-directed threats were asked to think of, and decide on, a fitting response under low or high time pressure. We report all measures, manipulations, exclusions, and the method of determining the sample size in the two studies.

3. Study 1

3.1. Method

3.1.1. 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., 2016), we calculated that to obtain a small to medium effect (η_p^2 = .02) with a mixed design would require at least one hundred participants (at power = .80, α = .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) × 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.

3.1.2. 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 sticks[2]). 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 have 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.

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 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 1). In total, the binary choice task consisted of 64 trials (crossing eight different pictures with eight different response pairs).

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 counterbalanced across trials. We manipulated time pressure: For each trial, half of the participants were asked to make their decision within 7 s (high time pressure); the other half first had a “thinking period” of 10 s during which they saw the threatening picture along with a pair of alternative responses, after which they had 7 s 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.

[2] 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).

Table 2
Preference for creative, original, and useful responses for each condition.

Preference	Condition							
	Self-directed threats				Other-directed threats			
	Low time pressure		High time pressure		Low time pressure		High time pressure	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Creativity	0.68	0.14	0.68	0.17	0.65	0.13	0.64	0.17
Originality	0.54	0.18	0.58	0.17	0.52	0.18	0.51	0.17
Usefulness	0.75	0.15	0.72	0.16	0.71	0.13	0.72	0.14

Note. Threat direction was manipulated within-subjects.

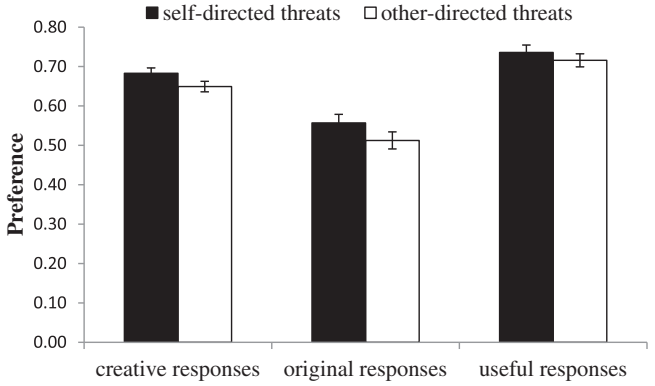

Fig. 1. Preference for creative, original, and usefulness threat-responses as a function of threat direction (Study 1, reported in percentage, $M \pm SE$).

3.1.3. 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 completed 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 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.

3.2. Results

3.2.1. 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 ($M = 2.11$, $SD = 1.16$), $t(132) = 7.40$, $p < .001$, Cohen's $d = 1.29$.

3.2.2. Preference for creativity

The descriptive statistics of each condition are reported in Table 2. First, 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) × 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 ($M = .68$, $SD = .16$) more frequently than those facing other-directed threats ($M = .65$, $SD = .15$; see Fig. 1). The main effect of time pressure, $F(1, 132) = 0.05$, $p = .830$, $\eta_p^2 = .00$, and the interaction effect between time pressure and threat direction, $F(1, 132) = .12$, $p = .733$, $\eta_p^2 = .00$, were not significant.

3.2.3. 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 a 2 (time pressure: high vs. low) × 2 (direction of threat: self-directed vs. other-directed threat) × 2 (type of responses: originality vs. usefulness) repeated measure ANOVA with the latter two factors within-subjects. The results showed a significant main effect of type of responses, $F(1, 132) = 95.46$, $p < .001$, $\eta_p^2 = 0.42$. Overall, the preference for high-useful responses ($M = .73$, $SD = .13$) was stronger than the preference for high-original responses ($M = .53$, $SD = .16$). Thus, supporting Hypothesis 1, usefulness weighs more heavily than originality, also when dealing with assaults from other humans.

In addition, there was a significant main effect of threat direction, $F(1, 132) = 14.87$, $p < .001$, $\eta_p^2 = .10$, but no significant interaction between threat direction and type of responses, $F(1, 132) = 2.21$, $p = .139$, $\eta_p^2 = .02$. Still, looking into the effect of threat direction on the preference for originality and usefulness separately, we found a significant main effect of threat direction on the preference for originality, $F(1, 132) = 10.51$, $p = .002$, $\eta_p^2 = .07$, with the high-original responses being selected more frequently under self-directed threats ($M = .56$, $SD = .18$) than under other-directed threats ($M = .51$, $SD = .18$) (see Fig. 1). The same pattern was found for preference for usefulness, $F(1, 132) = 4.67$, $p = .033$, $\eta_p^2 = .03$, with a slightly stronger preference for useful responses under self-directed threats ($M = .74$, $SD = .15$) than under other-directed threats ($M = .72$, $SD = .14$) (see Fig. 1). The main effect of time pressure ($F(1, 132) = .04$, $p = .845$, $\eta_p^2 = .00$), and the interaction between time pressure and threat direction ($F(1, 132) = .27$, $p = .606$, $\eta_p^2 = .00$), as well as the interaction between time pressure and type of responses ($F(1, 132) = 0.36$, $p = .552$, $\eta_p^2 = .00$) were not significant.

Finally, the three-way interaction was significant, $F(1, 132) = 6.90$, $p = .010$, $\eta_p^2 = .05$. Post-hoc contrasts of the three-way interaction revealed that when time pressure was high, there was a significant

effect of threat direction on the preference for originality, $F(1, 132) = 13.14$, $p < .001$, $\eta_p^2 = .09$, with more high-original responses being selected when exposed to self-directed rather than other-directed threats, but no difference on the preference for originality was found when time pressure was low, $F(1, 190) = .92$, $p = .339$. However, the pattern for the preference for usefulness was opposite: when time pressure was low, there was a significant effect of threat direction on the preference for usefulness, $F(1, 132) = 8.05$, $p = .005$, $\eta_p^2 = .06$, with more high-useful responses being selected when being exposed to self-directed rather than other-directed threats, but no difference was found when time pressure was high, $F(1, 132) = 0.05$, $p = .828$, $\eta_p^2 = .00$.

3.3. Discussion of Study 1

Study 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 and useful rather than original ideas (Rietzschel, Nijstad, & Stroebe, 2010). 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.

4. Study 2

Study 2 was designed to replicate Study 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 whether the null findings involving time pressure in Study 1 were robust rather than false negatives. More importantly, we extended Study 1 by testing whether perceived effectiveness of threat responses mediates the relation between threat direction and response selection. If the pattern observed in Study 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 & Driver, 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 feasible each alternative threat response was in dealing with the presented threats.

4.1. Method

4.1.1. Design and participants

Participants ($N = 239$, 74.5% female, $M_{age} = 22.36$, $SD = 4.96$) were randomly assigned to conditions of a 2 (time pressure: low vs. high) × 2 (direction of threat: self-directed vs. other-directed) between-subjects design. Based on the results in Study 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, feasibility, and effectiveness of the alternative threat responses.

4.1.2. Procedure, manipulation and dependent variables

The procedure, materials, and manipulations were the same as in Study 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-directed,[3] 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, 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 $\alpha = .90$), effective (Cronbach's $\alpha = .91$), and feasible (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). Originality is the degree to which an idea is unique, unusual, unexpected, or atypical. The usefulness of a response is determined by the effectiveness and feasibility of the response. Effectiveness is the degree to which an idea is helpful to avert the threat. Feasibility focuses on ease of application and is the degree to which an idea is practical or doable, considering any aspects of reality (e.g., room for escape). The order of the 16 responses was randomized. To support the distinction between originality, effectiveness, and feasibility, confirmatory factor analyses showed better fit for a three-factor model than for a two-factor model (originality vs. effectiveness *and* feasibility), and one-factor model (all $\Delta\chi^2 > 67.20$, $ps < .001$).

The preference for originality, usefulness, and creativity was computed as in Study 1. Additionally, from the response pairs that contained a high- and low-original response, we computed the average originality, feasibility, 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, feasibility, and effectiveness ratings of the high- and low-useful responses separately.

4.2. Results

4.2.1. Manipulation check

To verify the effectiveness of our manipulation of time pressure, we conducted a 2 (time pressure: high vs. low) × 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, $Fs < 1.29$, $ps > .25$.

We then submitted the originality ratings of high- and low-original responses to a paired sample t-test to verify that the originality of preselected high-original responses was, in fact, higher than that of the preselected 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 $d = 1.66$. Likewise, paired sample t-tests comparing feasibility and effectiveness ratings of preselected high and low-useful responses showed that high-useful responses were perceived as more feasible ($M = 4.54$, $SD = .85$) and effective ($M = 4.66$, $SD = .78$) than low-useful responses ($M_{feasible} = 4.11$, $SD = 0.94$, $t(238) = 8.52$, $p < 0.001$, Cohen's $d = .49$; $M_{effective} = 3.13$, $SD = .73$, $t(238) = 26.61$, $p < .001$, Cohen's $d = 2.02$).

[3] The added stimulus pictures were selected from the image set used in Study 1 (Kveraga et al., 2015). These pictures together with those ones used in Study 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 ($M = 3.53$, $SD = 1.61$).

Table 3
Means, standard deviations, and correlations (Study 2, $N = 239$).

		M	*SD*	1	2	3	4	5	6	7	8
1	Preference for originality	.48	.20								
2	Preference for usefulness	.76	.13	−.20**							
3	Preference for creativity	.67	.14	.51***	.13*						
4	Originality ratings of high-original responses	5.07	.99	.10	−.01	.08					
5	Originality ratings of high-useful responses	3.90	.98	.10	−.04	.01	.10				
6	Feasibility ratings of high-original responses	4.28	1.00	.02	−.01	.05	−.01	.01			
7	Feasibility ratings of high-useful responses	4.54	.85	−.09	.02	−.003	−.05	−.05	.61***		
8	Effectiveness ratings of high-original responses	3.72	.91	.36***	−.04	.34***	.02	.04	.01	.04	
9	Effectiveness ratings of high-useful responses	4.66	.78	−.02	.04	.16*	.11	−.04	.31***	.50***	.15*

* $p < .05$.
** $p < .01$.
*** $p < .001$.

Table 4
Preference for creative, original, and useful responses for each condition (Study 2).

Preference	Condition							
	Self-directed threats				Other-directed threats			
	Low time pressure		High time pressure		Low time pressure		High time pressure	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Creativity	.69	.16	.70	.14	.62	.12	.65	.12
Originality	.48	.20	.51	.23	.44	.15	.49	.20
Usefulness	.75	.12	.76	.13	.75	.14	.78	.13

Note. Threat direction was manipulated between-subjects.

4.2.2. Descriptive statistics

Table 3 shows means and standard deviations, along with zero-order correlations for all variables included in Study 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.

4.2.3. Preference for creativity

The descriptive statistics for each condition are reported in Table 4. 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) × 2 (direction of threat: self-directed vs. other-directed threat) between-subjects factorial ANOVA. Consistent with the results in Study 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 ($M = .70$, $SD = .15$) more frequently than those facing other-directed threats ($M = .63$, $SD = .12$). The main effect of time pressure, $F(1, 235) = 1.02$, $p = .314$, $\eta_p^2 = .00$, and the interaction effect between time pressure and threat direction, $F(1, 235) = .21$, $p = .646$, $\eta_p^2 = .00$, were not significant.

4.2.4. Preference for originality and usefulness

We then submitted the preference for originality and usefulness to a 2 (time pressure: high vs. low) × 2 (direction of threat: self-directed vs. other-directed threat) × 2 (type of responses: originality vs. usefulness) repeated measure ANOVA with the last variable within-subjects. Similar to Study 1's findings, the analysis revealed a significant main effect of type of responses, $F(1, 235) = 285.53$, $p < .001$, $\eta_p^2 = .55$, with the overall preference for usefulness ($M = .76$, $SD = .13$) being higher than the overall preference for originality ($M = .48$, $SD = .20$).

The main effect of threat direction was not significant, $F(1, 235) = .72$, $p = .396$, $\eta_p^2 = .00$. We then looked into its effect on preference for originality and usefulness separately and found that the main effect of threat direction on preference for originality was not significant, $F(1, 235) = 1.78$, $p = .184$, $\eta_p^2 = .01$, although means were in the expected direction; the effect of threat direction on preference for usefulness was not significant, $F(1, 235) = .37$, $p = .542$, $\eta_p^2 = .00$.

The main effect of time pressure was significant, $F(1, 235) = 3.99$, $p = .047$, $\eta_p^2 = .02$, with, in general, stronger preference for high-original and high-useful responses under high time-pressure. However, when looking into its effect on the preference for originality and usefulness separately, the effect of time pressure was not significant for either the preference for originality ($F(1, 235) = 2.31$, $p = .130$, $\eta_p^2 = .01$) or for usefulness ($F(1, 235) = .93$, $p = .337$, $\eta_p^2 = .00$).

There was no significant interaction between threat direction and time pressure, $F(1, 235) = .46$, $p = .498$, $\eta_p^2 = .00$, between threat direction and type of responses, $F(1, 235) = 1.76$, $p = .185$, $\eta_p^2 = .01$, or between time pressure and type of responses: $F(1, 235) = .44$, $p = .507$, $\eta_p^2 = .00$. In addition, and inconsistent with the findings of Study 1, the three-way interaction was not significant either, $F(1, 235) = .01$, $p = .908$, $\eta_p^2 = .00$.

4.2.5. Mediation analyses: effectiveness ratings as potential mediators

To test 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 ($N_{boot} = 5000$). As expected, threat direction influenced preference for creative responses indirectly through its effect on effectiveness ratings of high-original responses (*unstandardized indirect effect* = .02, $SE_{boot} = .01$, 95% CI = .007, .032). As can be seen in Fig. 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 ($B = .37$, $SE = .12$, $p = .001$), and the higher effectiveness ratings of the high-original responses led to an increased preference for creative responses ($B = .05$, $SE = .01$, $p < .001$). However, there was no evidence that threat direction affected preference for creativity through its effect on effectiveness ratings of high-useful responses (*unstandardized indirect effect* = .002, $SE_{boot} = .003$, 95% CI = −.001, .011).

Moreover, although we did not find a significant main effect of

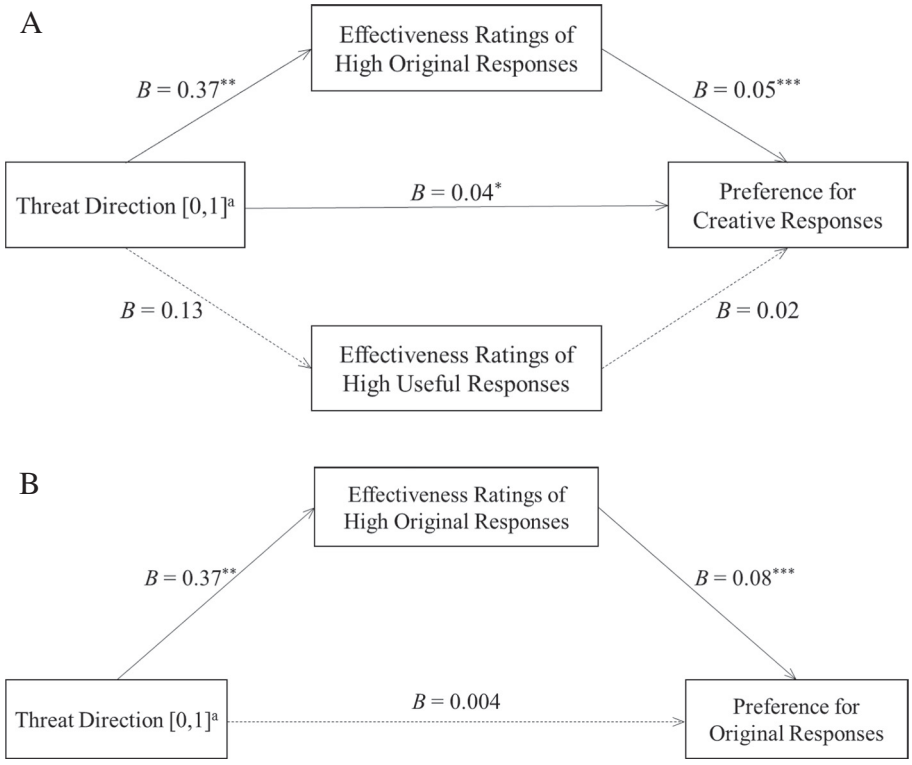

Fig. 2. Parallel multiple mediators model for preference for creative responses (Panel A) and simple mediation model for preference for original responses (Panel B) in Study 2 (displayed are unstandardized coefficients for each path). Effectiveness ratings of high-original responses rather than effectiveness ratings of high-useful responses mediated of the link between threat direction and preference for creative responses. Moreover, threat direction affected preference for originality indirectly through effectiveness ratings of high-original responses. [a]Self-directed threats = 1, other-directed threats = 0. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

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 Fig. 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 ($B = .37$, $SE = .12$, $p = .001$), and effectiveness ratings of high-original responses positively predicted the preference for high-original threat responses ($B = .08$, $SE = .01$, $p < .001$). The indirect effect was significant based on 5000 bootstrap samples (*unstandardized indirect effect* = .03, $SE_{boot} = .01$, 95% CI = .012, .053).

5. Study 3

Studies 1 and 2 both show that people under imminent threats have a preference for useful rather than original responses, while self-directed threats, compared to other-directed threats, led to a stronger preference for original (albeit indirectly) and creative responses, because original responses were perceived as more effective. However, in real-life situations, people under imminent threats have to think of *and* decide on an appropriate response themselves, rather than select from a list of pre-generated responses. Moreover, when facing imminent threats, people have to come up with a proper response quickly and the generation and selection of an appropriate response are high in temporal proximity and likely coincide. Therefore, to further raise the ecological validity of our findings, the goal of Study 3 was to examine the effect of imminent threat on creative threat-responding in a more realistic design in which participants had to think of, and decide on, a single response to each presented imminent threat. Based on the motivated focus account, we predicted more creative threat responses in people facing self-directed rather than other-directed threats. We additionally tested the effect of time pressure. Time pressure may not have an effect on the selection of pre-generated responses (see Studies 1 and 2), but could have an effect when people have to generate and decide on a response themselves as this situation may require more effortful information processing. Given that time pressure interferes with effortful thinking and achieving creativity often takes time (Braunstein-bercovitz, 2003; Finke et al., 1992; Nijstad et al., 2010), we examined whether there was a main effect of time pressure with lower creativity in people under high as compared to low time pressure. Moreover, although the interaction effects between time pressure and threat direction were not significant in the first two studies, we examined whether a possible interaction effect does occur with the new experimental paradigm in an exploratory fashion.

The new experimental design also enabled us to examine the type of tactics participants came up with. Adaptive threat-responding ultimately requires the preparation and execution of calibrated behaviors that meet situational demands and available resources (Gawronski & Cesario, 2013). The specific defensive behavior chosen depends on the features of the threat, such as the intensity, ambiguity, and the direction of the threat, as well as the context of the threat, such as the (in)escapability of the situation and the distance between the threat and the threatened subject (D. C. Blanchard, Hynd, Minke, Minemoto, & Blanchard, 2001; Gawronski & Cesario, 2013). For instance, defenders' responses vary systematically as threat imminence increases, changing from risk assessment and preparing for defensive actions when the threat is potentially, but not detectably, present, through freezing when the threat is detected but not attacking, to active defense actions, such as fight and flight, when confrontation is inevitable (Blanchard et al., 2001; Fanselow, 1994; Mobbs, Hagan, Dalgleish, Silston, & Prévost, 2015).

One feature that influences the perception of threat imminence, and that may thus modulate the type of defensive responses that people

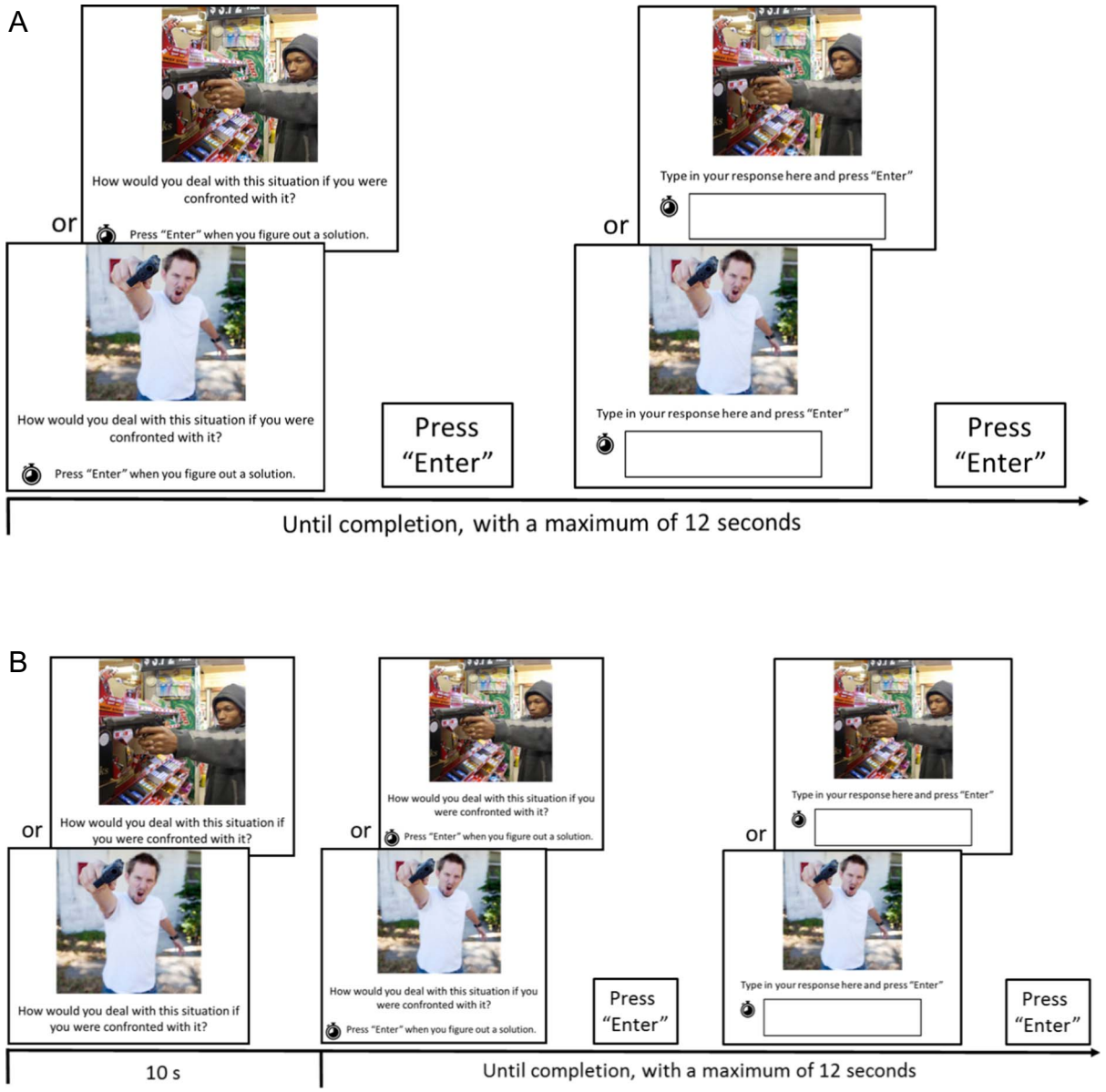

Fig. 3. Schematic illustration of a trial in the creative defense response task in the high time-pressure condition (Panel A) and low time-pressure condition (Panel B). In the high time-pressure condition, a trial started with the presentation of a picture depicting either self-directed threats or other-directed threats. Participants were asked to think about one response to the depicted situation and press "Enter" when they figured out their solution. Hereafter, they typed in their response in the given box and pressed "Enter" when they finished typing. The trial ended after the response was registered or 12 s had elapsed since the onset of the trial. In the low time-pressure condition, participants first saw the picture and question for 10 s in which they could not enter their response. After that, the trial was identical to the one in the high time-pressure condition.

come up with, is the direction of threat – whether the threat is directed towards, or away from, the observer. To explore this possibility, the tactics generated by participants were coded into eight broad defense categories: flight tactics (e.g., "run away", "walk backwards"), fight tactics (e.g., "strike back", "find weapons"), freeze tactics (e.g., "stand still", "make no sound"), risk assessment tactics (e.g., "be vigilant", "check out the situation"), cooperative approach tactics (e.g., "convince the attacker that it is meaningless to hurt you", "act friendly"), non-functional avoidance tactics (e.g., "ignore the threat", "act as if nothing is wrong"), help-seeking behaviors (e.g., "call for help", "seek protection in a group") and unspecified tactics that contained ideas that could not be coded into the former seven (e.g., "take precautions", "stay calm"). These eight categories were derived from Blanchard's (1997) work and the results of a pre-test. Several changes were made to Blanchard's original list of five defensive behaviors that were derived from the animal literature, mostly to accommodate uniquely human responses. First, we put defensive threat and defensive attack together under the category "fight" because they both represent approach-oriented active defense tactics that are usually displayed when threats are imminent. Second, we separated non-functional avoidance from freeze tactics, because non-functional avoidance includes deliberately denying the existence of the threat, which is different from freezing – the absence of all overt behaviors induced by overwhelming threats (Bolles & Collier, 1976). Third, we added a help-seeking category because in threatening circumstances, it may be highly adaptive to seek protection from relevant others (Griskevicius et al., 2006), including members of the in-group or the police. Fourth, because humans have highly developed language skills and a strong ability for perspective taking, cooperative approach was included as a separate category. From the generated ideas, we could extract the number of ideas within the aforementioned eight defense categories.

5.1. Method

5.1.1. Design and participants

On the basis of earlier work (Cheng et al., 2016; Roskes et al., 2012) and the findings of the first two studies, we expected to obtain small to medium effect sizes. Using the G*Power software (Faul et al., 2007), we calculated that to obtain a small to medium effect (η_p^2 = .025) would require 309 participants (at power = .80, α = .05). We recruited 328 participants (73% female, M_{age} = 21.97, *SD* = 3.01) in two waves of data collection. Participants received €5 or course credit and were randomly assigned to conditions of a 2 (time pressure: low vs. high) × 2 (threat direction: self-directed vs. other-directed) between-subjects design. Dependent variables were manipulation checks, the mean originality and usefulness of the threat-responses, the number of creative threat-responses participants generated, and the type of responses that participants generated. The study had ethics approval, and participants signed informed consent and were debriefed upon completion of the study. We report all measures, manipulations, and exclusions in the study.

5.1.2. Procedure and manipulation

After participants were seated in individual cubicles equipped with a computer that displayed all instructions and registered all responses. Participants were instructed that they would see a series of pictures depicting threatening situations and for each situation, they were asked to think about and type in what they would do when they would be confronted with the threatening situation shown in the picture (see Fig. 3). Depending on threat-direction condition, pictures depicted threats directed at the viewer (self-directed threat), or threats not directed at the viewer (other-directed threat; see Studies 1 and 2). In total, participants completed 7 trials,[4] with each trial containing a different picture and with pictures presented in random order.

In addition to manipulating the direction of the threat, we manipulated time pressure. To enable participants to key in their threat response, they were allotted more time than in Studies 1 and 2 where participants only had to select their response with a mouse click. Thus, half of the participants were asked to think about, decide, and enter their response within 12 s (high time pressure); the other half were also asked to generate and enter their response, but first had a "thinking period" of 10 s during which they could not type in their answer; following this 10s period they had another 12 s to enter their response (low time pressure). In both conditions, the time available for generating and typing was indicated by a timer. Following this task, participants answered some questions about perceived time pressure and their feelings regarding the pictures.

5.1.3. Dependent variables

We assessed the extent to which participants perceived the pictures as threatening ("I found the pictures threatening", "I found the pictures negative", and "I found the pictures unpleasant", Cronbach's α = .77) and arousing ("I felt vigilant while looking at the pictures", and "I felt alert while looking at the pictures", Cronbach's α = .86), and on two single items whether the situations depicted in the pictures were personally relevant and directed at participants on a 7-point scale (1 = *strongly disagree*, to 7 = *strongly agree*). In addition, participants indicated whether they experienced time pressure and whether they had plenty of time to come up with a response (reverse scored) on a 1 (strongly disagree) to 7 (strongly agree) scale (Cronbach's α = .73).

From the threat-responses participants entered, we calculated the mean originality and usefulness of ideas and the number of creative ideas. To obtain a measure of originality, one trained and independent coder scored each idea for the extent to which it was novel and uncommon on a 5-point scale (1 = *not original at all*, 5 = *very original*). To obtain a measure of usefulness, one trained and independent coder scored each idea for the extent to which it was feasible and effective on a 5-point scale (1 = *not useful at all*, 5 = *very useful*). To facilitate comparability between studies, ratings were based on the originality and usefulness ratings of the preselected responses of the pre-test (see Study 1). However, many of the alternative responses in Study 3 were not among the preselected responses of the pre-test. These responses received new originality and usefulness ratings. In addition, many originality and especially usefulness ratings depended on the threatening situation depicted in the picture. For instance, running away when facing an aggressor with a knife is more useful than running away from an aggressor with a gun, and even more useful if the threatened person is not the focal point of interest of the aggressor (i.e. in the other-directed threat condition). Therefore, the originality and especially usefulness ratings were based of the specific threatening situation depicted in the picture. A second rater coded a subset of 120 threat responses. Interrater reliability for originality (*ICC* = .81, $p < .001$) and usefulness (*ICC* = .84, $p < .001$) was good. We averaged originality and usefulness ratings across all ideas an individual generated to correct for differences in fluency. To obtain a measure of creativity, we counted the number of ideas that had a minimum rating of 3 on both the originality and usefulness dimension.

We additionally content-coded each threat-response. The threat-responses generated by participants were coded into eight broad defense categories: flight tactics, fight tactics, freeze tactics, risk assessment tactics, cooperative approach tactics, non-functional avoidance tactics, help-seeking tactics, and unspecified tactics that contained ideas that could not be coded into the former seven (see Introduction of Study 3). One trained and independent rater coded all tactics. A second rater coded a subset of 120 tactics. Interrater reliability was excellent, Cohen's K = .96, $p < .001$, and differences were solved through discussion.

5.2. Results

5.2.1. Manipulation checks

We submitted manipulation check indicators to separate 2 (time pressure: high vs. low) × 2 (direction of threat: self-directed vs. other-directed threat) ANOVAs. For the extent to which threats in the pictures were perceived as being directed to themselves, we only found a main effect of threat direction, $F(1, 324) = 356.87$, $p < .001$, $\eta_p^2 = .52$. Participants in the self-directed threat condition reported the threats in the pictures to be more directed to themselves (*M* = 5.94, *SD* = 1.26) than those in the other-directed threat (*M* = 3.02, *SD* = 1.52). Although threat direction did not influence the experience of threat, $F(1, 324) = 1.60$, $p = .206$, $\eta_p^2 = .01$; threat direction did affect arousal, $F(1, 324) = 8.83$, $p = .003$, $\eta_p^2 = .03$. Participants in the self-directed threat condition felt more vigilant and alert (*M* = 5.20, *SD* = 1.31) than those in the other-directed threat condition (*M* = 4.76, *SD* = 1.39). We also obtained the main effect of threat direction on personal relevance ratings, $F(1, 324) = 5.55$, $p = .019$, $\eta_p^2 = .02$, with stronger personal relevance reported in the self-directed (*M* = 3.80, *SD* = 1.82) than in the other-directed threat condition (*M* = 3.34, *SD* = 1.72). No effects involving time pressure were found, $Fs < 1$, $ps > .399$. Thus, although the level of threat was the same for both conditions, self-directed threats were perceived as more self-directed, arousing, and personally relevant, than other-directed threats.

When looking at perceived time pressure, the 2 (time pressure: high vs. low) × 2 (direction of threat: self-directed vs. other-directed threat) ANOVA revealed that participants in the high time pressure condition experienced more time pressure (*M* = 5.56, *SD* = 1.36) than those in the low time pressure condition (*M* = 4.22, *SD* = 1.79), $F(1, 324) = 57.95$, $p < .001$, $\eta_p^2 = .15$. No other effects were found, $Fs < 1$, $ps > 0.48$. Accordingly, we conclude that direction of threat and time

[4] For another research project, participants also completed 7 trials depicting aggressive encounters with animals. Interested readers can obtain findings from the second author.

Table 5
Creativity scores for each condition.

	Condition							
	Self-directed threats				Other-directed threats			
	Low time pressure		High time pressure		Low time pressure		High time pressure	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Creativity	.46	.82	.41	.87	.20	.46	.08	.32
Originality	1.75	.42	1.62	.33	1.40	.31	1.32	.27
Usefulness	3.34	.45	3.41	.39	3.64	.46	3.61	.48
Flight tactics	1.30	1.10	1.84	1.76	1.17	1.01	1.05	.97
Fight tactics	1.17	1.43	.65	1.01	.67	.95	.57	.86
Freeze tactics	.19	.50	.20	.62	.23	.48	.24	.55
Exploration tactics	.12	.43	.07	.30	.26	.65	.04	.19
Cooperation tactics	3.07	1.83	2.95	1.97	3.73	1.42	3.98	1.64
Avoidance tactics	.01	.11	.06	.29	.00	.00	.01	.11
Help seeking tactics	.06	.24	.07	.26	.41	.77	.22	.56
Unspecified tactics	.81	.91	.71	.71	.33	.67	.42	.72

pressure were manipulated as intended.

5.2.2. Creativity

To test our hypotheses, we submitted the number of creative responses to a 2 (time pressure: high vs. low) × 2 (direction of threat: self-directed vs. other-directed threat) ANOVA. Whereas the main effect of time pressure ($F(1, 324) = 1.21$, $p = .273$, $\eta_p^2 = .00$) and interaction between time pressure and direction of threat were not significant ($F(1, 324) = 0.21$, $p = .651$, $\eta_p^2 = .00$), there was a main effect of threat direction, $F(1324) = 16.05$, $p < .001$, $\eta_p^2 = .05$, with more creative responses generated in the self-directed threat condition ($M = .43$, $SD = .84$) than in the other-directed threat condition ($M = .14$, $SD = .40$).

5.2.3. Originality and usefulness

We submitted the mean originality and usefulness of the responses to a 2 (time pressure: high vs. low) × 2 (direction of threat: self-directed vs. other-directed threat) × 2 (creativity dimension: originality vs. usefulness) repeated measures ANOVA with the latter factor within-subjects. First, there was a main effect of dimension, with generated ideas being much more useful ($M = 3.50$, $SD = .46$) than original ($M = 1.52$, $SD = .37$), $F(1, 324) = 2459.54$, $p < .001$, $\eta_p^2 = .88$. Second, there were main effects of time pressure ($F(1, 324) = 6.28$, $p = .013$, $\eta_p^2 = .02$) and threat direction ($F(1, 324) = 3.91$, $p = .049$, $\eta_p^2 = .01$), with higher scores obtained in the low as compared to high time pressure condition, and in the self-directed as compared to the other-directed threat condition (see Table 5 and findings below).

Third, whereas the two- and three-way interaction effects involving time pressure were not significant, $F < 2.29$, $p > .130$, $\eta_p^2 < .01$, there was an interaction between creativity dimension and threat direction, $F(1, 324) = 52.29$, $p < .001$, $\eta_p^2 = .14$. Two one-way ANOVAs showed that the ideas generated in the self-directed threat condition were more original ($M = 1.68$, $SD = .38$) and less useful ($M = 3.37$, $SD = .42$) than those generated in the other-directed threat condition ($M_{originality} = 1.36$, $SD = .29$; $M_{usefulness} = 3.63$, $SD = .47$), $F_{originality}(1, 324) = 76.32$, $p < .001$, $\eta_p^2 = .19$; $F_{usefulness}(1, 324) = 26.49$, $p < .001$, $\eta_p^2 = .08$. The same ANOVA revealed that ideas generated in the low time pressure condition ($M = 1.57$, $SD = .40$) were more original than those in the high time pressure condition ($M = 1.47$, $SD = .34$), $F(1, 324) = 7.96$, $p = .005$, $\eta_p^2 = .02$. No other significant effects were found, $F < 1.06$, $p > .305$, $\eta_p^2 < .01$.

5.2.4. Type of threat responses

To examine the effect of time pressure and threat direction on the type of threat-responses people came up with, we submitted the number of responses generated within each tactic type to a 2 (time pressure: high vs. low) × 2 (direction of threat: self-directed vs. other-directed threat) × 8 (defense category: flight, fight, freeze, risk assessment, cooperative approach, non-functional avoidance, help-seeking, and unspecified tactics) repeated measure ANOVA with the latter factor within-subjects. We found a significant main effect of time pressure, with more responses being generated in the low ($M = 6.66$, $SD = .48$) as compared to the high time pressure condition ($M = 6.54$, $SD = .86$), $F(1, 324) = 8.77$, $p = .003$, $\eta_p^2 = .03$. In addition, we found a significant main effect of defense category, $F(7, 318) = 1071.18$, $p < .001$, $\eta_p^2 = .96$. As can be seen in Table 5, contrasts comparing the number of ideas for each tactic type to the number of ideas for the preceding tactic type showed that individuals came up with more cooperative approach tactics than flight tactics ($p < .001$), more flight tactics than fight tactics ($p < .001$), more fight tactics than unspecified tactics ($p = .012$), more unspecified tactics than freeze, help seeking, and exploration tactics ($p < .001$), and with more exploration tactics than non-functional avoidance tactics ($p < .001$). Another striking finding was that 51% of all generated tactics were cooperative approach tactics (e.g., giving in to the attacker, cooperate, do as you're told), and cooperative approach, flight, and fight tactics combined comprised 83% of all generated tactics.

We also obtained significant interaction effects between threat direction and defense category, $F(7, 318) = 10.01$, $p < .001$, $\eta_p^2 = .18$, between time pressure and defense category, $F(7, 318) = 3.65$, $p = .001$, $\eta_p^2 = .07$, and an uninterpretable three-way interaction, $F(7, 318) = 2.07$, $p = .046$, $\eta_p^2 = .04$. We then did simple effects analyses to inspect the two-way interaction effects. We corrected for multiple comparisons using the stepwise Bonferroni method proposed by Holm (1979), which has the advantage that it controls for multiple testing without a loss of power. In this procedure, the observed *p*-values (starting with the smallest value, then moving to the second smallest, etcetera) are checked against statistical significance values adjusted for the number of tests (0.05 / (number of tests [k] - the number of tests for which the null-hypothesis was rejected [x]). The null hypothesis is rejected for a comparison if the observed *p*-value is smaller than 0.05 / (k − x).

After correcting for multiple comparisons, Table 5 shows no significant effects involving time pressure, $Fs(1, 324) \leq 8.50$, $p \geq .004$, $\eta_p^2 < .03$, and no effects of threat direction on the number of fight tactics ($F(1, 324) = 6.11$, $p = .014$, $\eta_p^2 = .02$), freeze tactics ($F(1, 324) = .51$, $p = .476$, $\eta_p^2 < .01$), exploration tactics ($F(1, 324) = 1.12$, $p = .290$, $\eta_p^2 < .01$), and non-functional avoidance tactics ($F(1, 324) = 2.81$, $p = .095$, $\eta_p^2 = .01$). However, there was a significant effect of threat direction on the number of flight tactics, $F(1, 324) = 10.96$, $p = .001$, $\eta_p^2 = .03$, with more flight tactics generated in the self-directed threat condition ($M = 1.57$, $SD = 1.49$) than in the other-

directed threat condition (M = 1.11, SD = .99). There also was an effect of threat direction on the number of cooperative approach tactics, F (1, 324) = 19.34, p < .001, η_p^2 = .06, with more cooperative tactics being generated in the other-focused threat condition (M = 3.85, SD = 1.54) than in the self-focused threat condition (M = 3.01, SD = 1.90). An effect of threat direction on the number of help seeking tactics, F(1, 324) = 19.02, p < .001, η_p^2 = .06, showed more help seeking tactics in the other-focused threat condition (M = .31, SD = .68) than in the self-focused threat condition (M = .07, SD = .25). Finally, participants in the self-focused threat condition generated more unspecified tactics (M = .76, SD = .81) than those in the other-focused threat condition (M = .38, SD = .69), F(1, 324) = 21.26, p < .001, η_p^2 = .06.

6. Discussion

When given ample time to consider many possible solutions, threat exposure has been shown to lead to a focused use of cognitive resources to deal with the threat at hand, resulting in creative responding in threat-relevant domains (Cheng et al., 2016; De Dreu & Nijstad, 2008; Van Leeuwen & Baas, in press). However, threats in real life often require an urgent, single response. Therefore, the primary goal of the current study was to examine whether and how *imminent* threats influence creative threat-responding. Regardless of whether threatened participants selected their responses from a list of pre-generated responses (Studies 1 and 2) or had to think of, and decide on, a response themselves (Study 3), results of the current studies show that they generally preferred useful responses to original responses. Although effect sizes were modest, we also found that people under self-directed threats selected and generated more creative responses than those under other-directed threats, and this effect may be 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. We did not find a significant effect of time pressure on the *selection* of threat responses, nor did time pressure seem to moderate the effects of threat direction. However, people tended to *generate* more original ideas under low rather than high time pressure. Lastly, when thinking and deciding on a response themselves, threatened participants mostly came up with tactics to either cooperate with the attackers, fight them, or flee the scene, although the type of tactic depended on threat direction (see below). In sum, whereas threatened people strongly tend to favor useful rather than original responses to cope with the threat at hand, 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.

6.1. The bias in favor of usefulness

Consistent with previous work that shows that people have a general bias in favor of practicality relative to originality (Mueller et al., 2012; Rietzschel et al., 2010), our results revealed that people generally prefer and think of useful responses rather than original responses. They selected more highly useful ideas than highly original ideas and came up with ideas that were much more useful than original. Moreover, although the highly original responses were seen as more effective in the self-directed than in the other-directed threat condition, the perceived effectiveness of original threat responses never surpassed the perceived effectiveness of useful options. Because feelings of uncertainty have been shown to increase this bias in favor of usefulness (Mueller et al., 2012) and threats are often accompanied by feelings of uncertainty, threatening circumstances may likewise strengthen the relative value placed on usefulness. However, in the absence of a control condition, no conclusions about this possibility can be drawn on the basis of the current data.

Future work on the threat-creativity link may include such a control condition. This has the additional benefit of revealing whether the findings regarding threat direction are due to self-directed threats, other-directed threats, or perhaps both. At the same time, a control condition may be difficult to implement in the currently used research designs in which participants were asked to generate or select a specific response to a threatening situation. What would a proper control condition look like? One possibility is to vary the nature of the situations people have to respond to. However, it makes little sense to ask participants to respond to a situation depicting matching control stimuli (for instance, a sales person holding a gun in a gun store). The (response to the) situation simply is not comparable. Another possibility would be to prime people with a picture (either self-directed threat, other-directed threat, or matching control stimuli) and then ask people to generate a response to another threat (e.g., what would you do if you would encounter a suspicious person in a dark alley?). However, here the threat features of interest are not part of the threat situation to which people respond to. Carefully implementing a proper control condition may therefore prove to be rather cumbersome.

6.2. Imminent threats, perceived effectiveness, and urgent threat-responding

Current study findings both support and extend the motivated focus account of threat-relevant creativity (De Dreu & Nijstad, 2008). According to this account, threatened people are highly motivated to focus their attention and devote their cognitive resources to manage the threat at hand, which results in the generation of creative solutions to deal with that threat. Accordingly, we predicted that compared to low-imminent threats, high-imminent threats would increase people's preference for, and generation of, 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 selected and generated more creative responses than those facing other-directed threats.

Previous work supporting the idea of motivated creativity mainly used paradigms in which participants had ample time to generate ideas. For example, participants had several minutes to generate possible uses for a brick while they were expecting a conflict (De Dreu & Nijstad, 2008), or generate defensive tactics while facing pictures with violent conspecifics (Cheng et al., 2016). Although generating many alternative threat-responses is important for successful threat management, people under imminent threats have limited time to think of, and select, the single best response for actual implementation. Therefore, our study extends previous work by testing the impact of imminent threats on urgent threat-responding and providing the first evidence that the idea of threat-relevant creativity through motivated focus pertains not only to prolonged idea generation but also to situations that call for urgent responding and 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 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 generated or selected. In the case of more imminent and self-relevant human assaults, high-original responses were more valued, selected, and generated to deal with the specific situation. In other

threatening circumstances, less original options may be deemed more appropriate and adaptive to cope with the threat at hand, such as conforming to others (Griskevicius et al., 2006). In fact, when thinking of threat-responses themselves, participants overwhelmingly came up with rather unoriginal but sensible cooperative approach tactics (e.g., giving in to the attacker, cooperate, do as you're told). This resonates with theories suggesting that encounters with aggressive humans elicit social fear, which originates from an evolved dominance/submissiveness system (Öhman, 1986; Trower & Gilbert, 1989). The function of submissiveness is to deter attack from dominant individuals, and accordingly, the most adaptive threat responses would be submissive tactics, including cooperative and appeasing behaviors. That 83% of all generated tactics in Study 3 were comprised of ideas in the cooperative approach, flight ("run away") and fight ("kick in the nuts") categories also suggests that the preselected original responses that participants could choose from in Studies 1 and 2 are not the responses that they would think of and execute themselves in real life.

More generally, our findings fit the notion that adaptive threat-responding ultimately requires the preparation and execution of calibrated behaviors that meet situational demands and available resources (Gawronski & Cesario, 2013). Supporting this notion, we also discovered that the specific type of tactics that people came up with was influenced by threat direction. When facing imminent and self-directed rather than other-directed threats, participants tended to generate more flight and fight tactics, but less cooperative approach tactics and help seeking tactics. This fits earlier work on ecological defense behaviors that suggests that defenders' responses vary systematically depending on whether threats are potentially present in the environment or at close distance and attacking (Fanselow, 1994; Fanselow & Lester, 1988): seeking help from others is more effective when the focus of the attacker's attention is somewhere else; active defense actions, such as fight and flight, are the most adaptive and likely responses when confrontation is inevitable (Blanchard et al., 2001; Fanselow, 1994; Mobbs et al., 2015). That threat responses generated by participants in the self-directed threat condition were less useful than those by participants in the other-directed threat condition (something we did not find in Studies 1 and 2) may also be explained by these findings. When the focus of the attacker's attention is somewhere else, more useful and effective threat responses are still available and feasible.

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 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, Study 3 showed that people under high time pressure generated less original ideas than those under low time pressure. Therefore, the different findings between studies 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.

On the basis of earlier findings (cf. Roskes et al., 2013), we also predicted that taking more time to think would especially benefit the creativity of people with stronger avoidance motivation, i.e. those facing threats directed at themselves. However, in none of our studies did time pressure and threat direction interact to impact creative threat-responding. Although this null-finding should be interpreted cautiously, it may suggest that creative threat responding is determined more by the level of motivation to avoid or resolve the threat than on the ability (cognitive or situational resources, including time available to think and respond) to engage in effortful processing. Another possibility is that the effortful and persistent thinking that is prompted by avoidance motivation during threatening circumstances only appreciably affects creativity when people have sufficient time to come up with (many alternative) responses. Although time pressure was successfully manipulated in the current study, in the low time pressure condition people may still have felt rather pressured to come up with a response and prolonged thinking was impossible regardless of time pressure condition.

7. Conclusion

Previous research on the influence of threats on creativity focused on prolonged idea generation only and left unclear whether and how threats influence creative threat responding that is urgent. Thus, the present study examined the effect of threat direction and time pressure on the selection and generation of urgent creative threat responses. Results show that the selection and generation of creative threat responses was largely unaffected by time pressure, but the direction of threat did affect creative threat responding: 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 and thought of 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.

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