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### Creativity under the gun

*How threat features and personal characteristics motivate creative responding*

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## **CHAPTER 6**

### **General Discussion**

In this dissertation, I set out to enhance our understanding of the effect of threats on creativity. It is commonly assumed that creativity is reduced in the face of threats. At the same time, original and useful solutions are beneficial and functional to manage threats and it seems plausible that throughout their evolutionary past, humans have evolved a set of functional mechanisms to adaptively and creatively respond to threats. This paradox leads to the question: whether and when can threats enhance creativity? The motivated Focus Account of Creativity (De Dreu & Nijstad, 2008) suggests that threats motivate the recruitment and allocation of cognitive resources onto threat-relevant materials and away from irrelevant materials, leading to creative ideas and solutions in domains that are relevant to deal with the specific threats at hand, but not in domains that are threat-irrelevant. Based on this account, the main goal of the present dissertation was to uncover the circumstances in which, why, and for whom threats facilitate creativity. In four empirical chapters, the effects of threats on information processing, idea generation, and idea selection processes of creative problem solving were studied. In this chapter, I will present an overview of the core findings of this dissertation, discuss their theoretical and practical implications, and provide directions for future studies.

### **Threats and Inclusive Information Processing**

Chapter 2 examined whether and when health threats would lead to inclusive information processing. Health threats activate the disease-avoidance system that evolved to protect against health risks, trigger health-related cognitions, and elicit disgust (Curtis, Aunger, & Rabie, 2004; Warwick & Salkovskis, 1990). These specific health-induced responses are associated with the allocation and sustainment of attention to health-related information as well as the activation of health-related concepts into working memory (Charash & McKay, 2002; Park, Schaller, & Crandall, 2007), enabling people to see the relevance of information that may only remotely relate to the threat at hand. Accordingly, I predicted that people facing highly self-relevant health threats should show inclusive processing of health-related information, but restricted processing of health-irrelevant information. Two studies were reported to test this prediction. In Study 2.1, high vs. low self-relevant health threats were primed by emphasizing the negative consequences of alcohol abuse for participants themselves or senior citizens. In Study 2.2, health threats and violence threats were primed by pictures depicting symptoms of contagious diseases (strongly health-relevant) or aggressive attackers (weakly health-irrelevant). In addition, individual difference in chronic and current concerns about transmitting diseases was

measured to verify that the threat-induced inclusiveness is associated with motivation to deal with the specific threats.

Results showed that health threats can both narrow and broaden cognitive inclusiveness depending on the type of material that is being processed. For example, when processing weak exemplars of health-irrelevant categories (e.g., camel for vehicle and telephone for furniture), people facing high rather than low self-relevant health threat showed lower prototypicality ratings (i.e., lower levels of cognitive inclusiveness), but such restricted information processing disappeared when the exemplars of health-relevant categories (e.g., first-aid application for healthcare and nightmare for stress symptoms) were processed (Study 2.1). Other evidence was gained in Study 2.2, which showed that health threats specifically aimed at transmitting diseases led to more inclusive processing of material that pertained to this specific threat (e.g., source of infection and risks of contagion), whereas violence threats tended to induce relatively more inclusive processing of violence-relevant material (e.g., weaponry), rather than violence irrelevant material.

Furthermore, because motivation is supposed to play a crucial role in the focused inclusive processing of information, I predicted that the effects would especially show when the threats were highly self-relevant. Indeed, although participants in Study 2.1 were exposed to the same information of health threats, focused inclusiveness occurred when the personal relevance of threat was salient. In addition, Study 2.2 showed that chronic concerns rather than knowledge about transmitting diseases were associated with the cognitive inclusiveness of disease- and health-related material. Finally, Study 2.2 found that the threat-induced inclusive information processing was tied to information about the specific target threat, for example, contagious disease, and did not generalize to other threats or even a broader range of health issues (e.g., mental health). This finding resonates with the idea that threat management systems are functionally distinct systems that promote adaptive responses to the specific threats. The highly focused and inclusive processing of specific threat-relevant information is potentially adaptive, as it serves the goal of coping with the present threatening states.

### **Threats and Idea Generation**

Chapter 3 and 4 were about the effect of threats on idea generation within threat-relevant domains, specifically, the generation of defensive tactics to deal with possible threats. Chapter 3 reported three studies in which participants were asked to generate as many tactics as possible to deal with threats while pictures emerged on the

screen depicting self-directed threats (e.g., a man points a gun in the direction of the participants; Study 3.1 - 3.3), other-directed threats (e.g., a man points a gun in the direction of other people; Study 3.1 & 3.2) or neutral situations (e.g., a salesman holds a gun in a gun store; Study 3.1 - 3.3). Threats vary in nature, direction, and other features. Adaptively, threat-responding is highly specific and varies as the nature and imminence of the threat changes (Blanchard et al., 2001; Mobbs et al., 2015). Based on these observations, our main prediction was that threats may selectively promote certain types of tactics that are most suited to deal with the specific threat at hand. For instance, it would be more appropriate to come up with creative negotiation tactics when being confronted with another aggressive human being than with an aggressive animal.

Results across three studies in Chapter 3 revealed that rather than a generalized impact on defensive originality, threat exposure selectively stimulated more original fight tactics and less original risk assessment tactics, such as monitoring the immediate environment and being vigilant. This is in line with threat-responding in animals, for which fight is the most adaptive and likely response when the situation is imminent and inescapable, while risk assessment is the most adaptive and likely response when the threat is potentially present (Blanchard et al., 2011; Mobbs et al., 2015). It thus appears that when thinking about tactics to deal with threatening situations, threatened people may selectively focus their attention and cognitive resources on original thinking pertaining to types of defense tactics that allow them to successfully manage the threat, and not to tactics that are less functional for self-protection. This idea was also supported by the findings in Study 3.2 that exposure to human as opposed to animal threats motivated original cooperative tactics, including apology and negotiation, because such language-based tactics only make sense when confronted with human attack; on the other hand, facing animal as opposed to human threats stimulated original freeze and risk assessment tactics, which are adaptive in the face of close-in aggressive animals (Harrison et al., 2015). Finally, Study 3.3 showed that threats (vs. neutral condition) stimulated more original fight and flight tactics only among individuals who were low in self-esteem and thus felt especially anxious in response to threats. This finding implies that threats enhanced creativity in adaptive defense categories only for those who are especially vulnerable to threats and are thus strongly motivated to neutralize the threats and regain safety. It thus suggests that motivational aspects rather than primed conceptual knowledge drive the effects I found. However, in both Study 3.1 and 3.2, direction of threat did not differentially influence creative ideation in different defensive categories. I will discuss

possible reasons for this null finding and its implication in the Implications and Future Directions section.

Threatening circumstances often require immediate responding. This leaves open the question whether people are still creative when facing an imminent threat that requires immediate responding? In Chapter 4, threat effects on creativity were studied in a more realistic setting where an urgent, single response was required to manage a specific threat. I examined the effects of time pressure and threat direction, two factors that are highly relevant in urgent threatening situations. To study their effects, participants completed several trials in which they could only give one threat response to a presented threat. The presented threats were either self-directed or other-directed threats and participants had little time or sufficient time to generate and key in their response. From the motivated focus account, it follows that in response to a threat, people facing high self-relevant rather than low self-relevant threats will be more creative, because higher personal relevance evokes greater avoidance motivation, and the level of avoidance motivation determines the level of threat-induced creativity (Baas et al., 2011; De Dreu & Nijstad, 2008). Indeed, the results showed that threats directed towards oneself motivated more original responses than threats directed to others, and this was especially the case for people scoring high on avoidance temperament. The finding regarding the dispositional factor (i.e. avoidance temperament) further underscores the important role of motivation in explaining the enhancing effect of threat on threat-relevant creativity. Furthermore, threat urgency is also characterized by the need to respond immediately, and this may result in the experience of time pressure (Ordóñez & Benson, 1997). While creativity takes time and requires extensive processing, time pressure taxes cognitive resources and interferes with focused and effortful thinking. Thus, I expected to see reduced original responding in the high time pressure condition. As expected, I observed a detrimental effect of high time pressure on creative responding under threats. In addition, creative responding is influenced by time pressure and threat direction in an additive rather than interactive manner, with the highest originality of threat responses emerging in people facing self-directed threats with low time pressure. This finding suggests that creative performance under threats may be influenced not only by the level of avoidance motivation but also by the (cognitive and situational) resources to engage in effortful and focused processing (also see Roskes et al., 2012, 2013).

### **Threats and Idea Selection**

Chapter 5 focused on the role of threat on an important but usually overlooked stage in creative problem solving – idea selection (Rietzschel et al., 2006, 2010). While generating many creative tactics is important in response to a threatening situation, the selection of tactics determines whether the best tactic can be retained for further implementation and influences problem-solving effectiveness. The goal of Chapter 5 was to examine whether and how imminent threats promote the selection of creative threat-responses. Following the ideas outlined in Chapter 4, threat direction and time pressure were manipulated as features of imminent threats. To assess the selection of threat responses, I developed a binary choice task in which participants chose one out of two alternative threat responses that differed on either originality (low vs. high) or usefulness (low vs. high) to deal with each threat they saw on the screen. The presented threats were either self-directed or other-directed and participants had little time or sufficient time to select their response.

Results of two studies revealed that compared to those facing other-directed threats, people confronted with self-directed threats – situations that are more imminent and self-relevant – had a greater preference for responses that are both original and useful. This finding is consistent with the idea that threats promote threat-related creativity through motivated focus; the more motivated people are, the more likely the threat-related creativity-effect is to emerge. More important, it provides the first evidence that the motivated focus account pertains not only to the idea generation process but also to the idea selection stage of creative problem solving. Furthermore, Study 5.2 showed that the perceived effectiveness of high-original tactics played an important role in the relation between threat direction and creative response selection. Compared to those facing other-directed threats, participants facing self-directed threats perceived high-original responses to be more effective in dealing with the threat at hand and this increased perceived effectiveness explained their preference for creative responses. This finding highlights the adaptive value of original responses in coping with imminent threats and its role in explaining the selection of creative tactics in response to threats: In case of high (vs. low) imminent and self-relevant threats, people are more motivated to search for a way to better protect themselves, and creative responses are selected because of their effectiveness in managing imminent threats. Different from what has been found in Chapter 4, both studies in Chapter 5 showed no effect of time pressure on creative response selection. Possible explanations will be provided in the following section.

## **Theoretical Implications**

Fueled by the paradox that creativity is usually hampered by threat yet also needed to deal with it, this dissertation was set up to better understand the relation between threats and creativity. Specifically, I asked whether and when threats would promote creativity. Supporting the idea that threats improve people's creativity when their creativity is relevant and functional to deal with the threat at hand (De Dreu & Nijstad, 2008), the current dissertation shows that rather than a general decline, threats promote creativity-related processes that are relevant to dealing with the specific threat at hand. Furthermore, findings of the current dissertation advance the motivated focus account by showing that threat-relevant creativity is highly specific and situation dependent. Health threats evoked by infectious diseases motivated more inclusive processing of disease-relevant material rather than other health-related information that is irrelevant to infectious diseases, such as mental disorders (Chapter 2). Within a threat-relevant domain of thought, creativity only occurred in the defensive categories that are adaptive given to the specific features of the situation (Chapter 3). Furthermore, the creativity of threat responses was affected by both the self-relevance of the presented threat (Chapter 4 and 5, but see Chapter 3) and the available resources for creative thinking, such as time (Chapter 4, but see Chapter 5).

The motivated focus account suggests that the creativity-enhancing effect of threat is driven by the motivation to deal with the presented threats. The findings of this dissertation attest to the crucial role of motivation in the threat-creativity relation. Although threat direction did not influence the generation of creative tactics when threat-responding was not urgent (Chapter 3), it has been shown that within threat-relevant domains, for example, when dealing with threatening situations, high self-relevant compared to low self-relevant threats motivated the generation of more original defensive responses when a single, urgent response was required (Chapter 4) and the selection of more creative responses (Chapter 5), implying that the strength of motivation to avoid or resolve the threats determines the level of threat-relevant creativity. Furthermore, the results regarding the individual differences corroborated the crucial role of motivation in threat-relevant creativity. In Study 2.2, chronic health concerns, rather than knowledge, about transmitting diseases positively predicted cognitive inclusiveness in disease-relevant domains. Moreover, exposure to imminent threats elicited more original fight and flight tactics – the tactics that are more adaptive and favored in dealing with



imminent threat – only among individuals with low self-esteem (Study 3.3). Finally, compared to other-directed threats, self-directed threats led to more creative defense responses especially for people that score higher on avoidance temperament (Chapter 4). These findings again imply that the strength of motivation is essential in driving threat-relevant creativity: threats increased creativity in relevant and adaptive domains especially for those who are highly sensitive and vulnerable to threats and are thus strongly motivated to avoid and solve the problems at hand.

Our findings also shed light on the question whether the idea of threat-relevant creativity through motivated focus can be generalized to the different stages of creative problem solving. The effects of threat on information processing, idea generation, and idea selection were systematically examined in the current dissertation. The results showed that threat exposure led to relatively higher cognitive inclusiveness in specific threat-related domains (Chapter 2), motivated more original defensive tactics that are appropriate and adaptive in the given circumstances (Chapter 3). Moreover, compared to those facing low self-relevant threats, people facing high self-relevant threats generated more original responses when the threat was imminent and only a single fitting response was required (Chapter 4). Lastly and importantly, the current dissertation extends the motivated focus account by 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. People confronted with high self-relevant threats preferred creative responses more than those in low self-relevant threats condition (Chapter 5). These findings provide evidence that the proposition that threats promote threat-relevant creativity through motivated focus not only pertains to idea generation but also to inclusive information processing and idea selection, and not only to situations in which people have ample time to generate responses but also to a more realistic setting in which an urgent, immediate response is required.

### **Limitations and Future Directions**

However, having demonstrated the detrimental effect of time pressure on the generation of creative threat responses in Chapter 4, I expected a similar negative effect of time pressure on the selection of creative responses. However, time pressure had no significant impact on the selection of creative responses in the two studies of Chapter 5. Although this result should be interpreted cautiously, it may suggest that generating and selecting ideas are inherently distinct processes that are differentially influenced by time

pressure. Various creativity theories have suggested a distinction between the process of generating ideas and the process of identifying the most creative idea (Cropley, 2006; Simonton, 1999). Factors and strategies that improve the performance of idea generation may have a different impact on idea selection, and vice versa. For example, a period of incubation facilitated people's performance in their selection but not their generation of creative ideas (Ritter et al., 2012). Moreover, focusing on a narrow rather than broad topic led to the generation of more original ideas, but it did not influence the selection of creative ideas (Rietzschel et al., 2014). Together with the findings in the current dissertation, these results suggest that the distinction between the process of idea generation and idea selection may be a critical factor in creativity research. Although necessary, generating original ideas is not sufficient for creative production and problem-solving. Idea evaluation and selection may even be more important, because it is this very process that enables people to evaluate how effective an original idea is in given circumstance and retain truly creative ideas for further implementation (Runco, 2008). For a better understanding of creative performance, more scientific research is required to study the distinction and interplay between the idea generation and idea selection stage, as well as the factors and strategies that influence the different stages of creative problem solving.

In the current dissertation, the effect of threat direction on idea generation and idea selection was tested. While self-directed (vs. other-directed) threats were perceived as more self-relevant and motivated the generation and selection of more original threat responses in Chapter 4 and 5, they did not lead to higher perceived self-relevance and more original defense tactics in Chapter 3. Possibly, including time constraints exacerbated the imminence and personal relevance of self-directed threats in Chapter 4 and 5. Another possible reason could be that the self-relevant nature of self-directed threats is less salient when threatening pictures are in the periphery (Chapter 3) rather than in the center of attention (Chapter 4 and 5). Therefore, through the more focused processing, participants in Chapter 4 and 5 were more likely to perceive the different levels of personal relevance that were represented in the stimuli. Although more work is required to understand the reasons behind the inconsistent findings regarding threat direction, the findings of Chapter 4 and 5 seem to imply that there is a link between self-relevance of threats and creativity in dealing with threats. Specifically, self-directed threats led to more threat-related creativity when participants perceived them as more self-relevant, but had no impact on creativity when participants perceived them as equally relevant.

I expect that the idea of specific threat-relevant creativity through motivated focus may generalize to other aversive situations. In addition to being exposed to threats to their health (diseases) and safety (assaults by humans and animals), humans are also exposed to a range of other threats, including the potential loss of valuable possessions and status and the risk of being socially rejected. For example, humans have a strong need for belongingness, and social exclusion – being excluded by others in social relationships – represents a powerful social threat (Baumeister, Brewer, Tice, & Twenge, 2007; Baumeister & Leary, 1995). Consequently, the experience of social exclusion stimulates a strong motivation and a specific set of cognitive and behavioral responses to affiliate and reconnect with others (Maner, DeWall, Baumeister, & Schaller, 2007). When threatened with social rejection, individuals show an increased sensitivity to social cues that indicate cooperative potential (Bernstein, Young, Brown, Sacco, & Claypool, 2008; Pickett & Gardner, 2005), and preferential processing of information relevant to affiliation (Gardner, Pickett, & Brewer, 2000). Furthermore, social exclusion increases strategic responses to regain social connection, for example, by expressing more interest in making new friends and by showing increased behavioral mimicry of others (Lakin, Chartrand, & Arkin, 2008; Maner et al., 2007). Following the motivated focus account, it is reasonable to predict that social exclusion may lead to more inclusive processing of affiliation-relevant information and more creative responses that facilitate re-affiliation, especially among those that are dispositionally high in the need to belong. Future research may explore these possibilities.

One important methodological limitation of the experiments in the current dissertation is that the threats that participants were exposed to were hypothetical and although participants were asked to generate or choose a threat-response that they would adopt when facing the presented threats in real life (Chapter 4 and 5), participants did not have to implement their responses. Accordingly, the findings should be interpreted cautiously when generalizing them to real threats and actual responses. Whether people are similarly creative when confronted with threats in real-life situations remains an empirical question.

However, due to ethical considerations, exposing participants to a real threatening situation in the laboratory is problematic, while field studies in which threats naturally occur often lack the control of confounding variables and do not allow conclusions about causal relationship. For these reasons, the current experimental designs were employed, and it is these designs that have helped us to identify particular threat features involved in

promoting specific threat-relevant creativity – such as self-relevance of threats (Chapter 2, 4, & 5), the nature of threats (Chapter 3), and time pressure (Chapter 4). To raise the ecological validity of the current studies, future studies may benefit from the use of immersive virtual environment technology, which creates a real-life simulation through multiple sensorial channels (Blascovich et al., 2012; Rovira, Swapp, Spanlang, & Slater, 2009). Future threat-creativity studies can thus use this technology to immerse participants into the computer-generated, threatening environments such that participants perceive themselves to be involved in, and interacting with, real threats, thereby enhancing the ecological validity while maintaining experimental control of every single variable.

Another limitation of the studies in the current dissertation is that they mainly focused on the originality of the generated tactics or responses (Chapter 3 and 4), but not on other quality dimensions, such as feasibility and effectiveness. While originality is commonly seen as the hallmark of creativity (Guilford, 1967; Torrance, 1966), a truly creative idea should also be appropriate and useful given the particular circumstances (Runco & Charles, 1993). This is especially the case with threat-responding where people benefit most from solutions that are uncommon yet not so bizarre that they are not relevant to the problem at hand or not feasible to implement. Previous work demonstrates that there is a tradeoff between the originality and usefulness of products or ideas (Mueller et al., 2012; Rietzschel et al., 2010). The results in Chapter 5 also illustrate a general preference for useful responses over original responses when dealing with threats. Moreover, Chapter 5 showed that threat direction affects the selection of original responses, but not the selection of useful responses. All these findings suggest the need to assess not only the originality of ideas or solutions, but also other quality dimensions, such as appropriateness and effectiveness in future threat-creativity studies.

### **Concluding Remarks**

In this dissertation, I set out to better understand the threat-creativity relation. Although it is commonly assumed that creativity is undermined by threats, the empirical studies presented in this dissertation show that threats do not have a generalized impact on creativity. Rather, they selectively enhance creativity that is relevant and functional in managing the specific threat at hand. Reduced creativity may only occur in domains that are deemed irrelevant in dealing with the threats people are facing.

This dissertation also attests to the crucial role of motivation for the domain-specific threat-relevant creativity effect to occur: threats promote threat-relevant creativity

through a motivated focus on coping with the problematic situation at hand. Such threat-induced motivated focus revealed itself in more original responses and greater preference for creative tactics when threats were more personally relevant, and for people that were especially sensitive and vulnerable to threats. In addition, this motivated focus account of threat-relevant creativity applies not only to creative idea generation, but also to inclusive information processing and idea selection. The current work thus implies that creativity is about being motivated to achieve desired goals. From a practical perspective, increasing people's motivated focus to cope with aversive and threatening situations, for example, by emphasizing the personal relevance of the threat, may be an effective way to promote creativity, because it is such motivated focus that underlies the creative spark in the dark.