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On angry approach and fearful avoidance: The goal-dependent nature of emotional approach and avoidance tendencies☆

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HIGHLIGHTS

- Past research suggests that anger relates to approach goals and fear to avoidance goals.
- We experimentally manipulated the superordinate goals of approach and avoidance.
- Anger was related to approach only if approach was dominant/aggressive.
- Fear was related to avoidance only if avoidance was submissive/non-aggressive.

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ABSTRACT

Previous research has revealed that feelings of anger are typically accompanied by the goal to approach the emotion-evoking stimulus and feelings of fear by the goal to avoid the emotion-evoking stimulus. We set up an experiment to investigate the boundary conditions of this set of relations. We hypothesized that anger is related to approach and fear to avoidance when approach serves the goal to dominate/aggress and avoidance the goal to be submissive, but that anger is related to avoidance and fear to approach if avoidance serves the goal to dominate/aggress and approach the goal to be submissive. We manipulated the superordinate goals of approach and avoidance in an experiment in which participants moved a manikin toward or away from an opponent, depending on whether an anger or fear word appeared on their manikin (self condition) or on the opponent (opponent condition). In one condition, approach was a dominant/aggressive response (i.e., fighting) and avoidance a submissive/non-aggressive response (i.e., fleeing); in another condition, approach was a submissive/non-aggressive response (i.e., begging) and avoidance a dominant/aggressive response (i.e., stubbornly turning the back). As predicted, the reaction times of approach and avoidance depended on the goals for which approach and avoidance were instrumental as well as on the locus of the feelings (self vs. opponent). The moderation by locus excluded explanations in terms of feature overlap between stimuli (anger/fear) and responses (fight/flight and beg/stubborn).

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Introduction

For decades, researchers have assumed that positive stimuli evoke the tendency to approach or reduce the physical distance between the self and the stimulus, and that negative stimuli evoke the tendency to avoid or increase the physical distance between the self and the stimulus (Chen & Bargh, 1999; Krieglmeyer, Deutsch, De Houwer, & De Raedt, 2010). Recently, however, several researchers have argued that negative stimuli do not invariably elicit avoidance. More specifically, negative stimuli that elicit fear or disgust have been shown to evoke avoidance, but negative stimuli that elicit anger have been shown to evoke approach (Carver & Harmon-Jones, 2009). The relation between anger and approach has been established across various studies and research paradigms (e.g., Carver & Harmon-Jones, 2009; Harmon-Jones, 2003; Harmon-Jones & Allen, 1998). For instance, the induction of angry feelings has been shown to speed up approach movements rather than avoidance movements (Maayan & Meiran, 2011) and to influence other correlates of approach motivation, such as relatively greater left than right frontal cortical activity (Harmon-Jones & Sigelman, 2001) and scores on the BIS/BAS scale (Yan & Dillard, 2010).

Several researchers have called on the unique relation between anger and approach to account for a wide array of research findings. For example, the finding of Lerner and Keltner (2001) that anger goes together with optimism and fear goes together with pessimism has been attributed to the fact that anger is related to approach and fear

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to avoidance (Harmon-Jones, Peterson, Gable, & Harmon-Jones, 2008). Prinz (2009) wrote that the association between anger and approach explains why people rather live close to a thief than close to a pedophile, even if they have no children. He suggested that the pedophile elicits avoidance-related feelings such as disgust, whereas the thief evokes approach-related feelings such as anger.

The aim of the present study was to investigate potential boundary conditions of the relations between anger and approach and between other negative feelings and avoidance. We focused on feelings of anger and fear because of their comparability with respect to valence and arousal (Russell & Barrett, 1999). We tested the hypothesis that the relations between anger and approach and fear and avoidance depend on the goals that these feelings reflect (e.g., Smits & Kuppens, 2005; Wilkowski & Meier, 2010). This hypothesis fits in a componential view of emotions in which emotions are presented as collections of changes in appraisal, motivation, somatic responses, motor expressions, and feelings (Moors, 2009; Roseman, 2001; Scherer, 2005). The motivational changes consist of the activation of action tendencies, that is, goals to establish a particular relation with the environment (Frijda, 1986). Feelings or emotional experiences are reflections of the changes in appraisal, motivation, somatic responses, and motor expression in consciousness. Feelings of anger reflect the goals to aggress or hurt someone (Averill, 1983; Berkowitz & Harmon-Jones, 2004; Lazarus, 1991; Plutchik, 2003; Roseman, Wiest, & Swartz, 1994) or to display one's dominance (Hess, Adams, & Kleck, 2009; Knutson, 1996; Morris & Keltner, 2000). Feelings of fear reflect the goal to protect oneself (Frijda, 1986; Lazarus, 1991; Roseman et al., 1994) or the goal to be submissive (de Waal, 2003; Fridlund, 1994; Marsh, Adams, & Kleck, 2005; Wilkowski & Meier, 2010). According to the hypothesis under study, the goals associated with anger and fear are superordinate goals, and the goals to approach and avoid are subordinate goals that are instrumental for these superordinate goals. In other words, to fulfill the superordinate goals related to anger, it is often functional to approach the stimulus, whereas to fulfill the superordinate goals related to fear, it is often functional to avoid the stimulus. Indeed, in order to aggress or hurt someone, one often needs to approach the person first (Smits & Kuppens, 2005). Moreover, social dominance is typically obtained and displayed by approach behaviors, such as by keeping rather than avoiding eye contact (Keltner, Gruenfeld, & Anderson, 2003; Mazur & Booth, 1998; Song, Herberholz, & Edwards, 2006; Terburg, Hooiveld, Aarts, Kenemans, & van Honk, 2011). Conversely, the goals to protect oneself and be submissive may be more easily reached via avoidance behavior, for instance, by stepping out of the way or by looking down (Frijda, 1986; Roseman et al., 1994). Thus, this hypothesis states that the relations between anger and approach and between fear and avoidance can be explained in terms of the functionality of approach and avoidance goals for other, superordinate, goals. Accordingly, these superordinate goals can be considered boundary conditions: Eliminating the functionality of approach and avoidance for the superordinate goals of dominance/aggression and submission/safety may eradicate the relations between anger and approach and between fear and avoidance. Moreover, switching the functionality of approach and avoidance for these superordinate goals (i.e., approach serves submission/safety goals and avoidance dominance/aggression goals) may reverse these relations.

To date, few studies have investigated whether approach and avoidance goals in the context of anger and fear are at the service of any of the superordinate goals mentioned above. Two studies have focused on the boundary conditions of the relation between anger and approach and showed that anger is accompanied by the goal to approach (measured via brain activity) only when there is an opportunity to approach (Harmon-Jones & Peterson, 2009; Harmon-Jones, Sigelman, Bohlig, & Harmon-Jones, 2003). These studies suggest that anger is not invariably related to approach, yet they do not necessarily imply that approach in the context of anger is at the service of a superordinate goal. To investigate this, one needs to manipulate the superordinate goals of approach and avoidance. A number of studies have done this in the context of perceiving angry faces. Wilkowski and Meier (2010) showed that angry faces were approached faster when they became fearful after approach (signaling dominance of the participant) than when they became happy after approach. Krieglmeyer and Deutsch (2013) found that angry faces elicited a stronger goal to approach when approach was framed as aggressive than when it was framed as peaceful and that the reverse was true for fearful faces. These studies provide support for the idea that the relation between anger and approach depends on a superordinate goal. Both studies on the role of superordinate goals, however, pertain to anger displayed by others, whereas the basic idea that anger is related to approach concerns anger as experienced by the self (e.g., Carver & Harmon-Jones, 2009). The question thus remains whether the relations between anger and fear as feelings of the self, on one hand, and approach and avoidance, on the other hand, also depend on superordinate goals.

To investigate this question, we developed a speeded reaction time (RT) task that allowed us to investigate relatively automatic approach and avoidance behaviors (Moors & De Houwer, 2006). We also took measures to exclude interpretations purely in terms of overlap between the concepts of anger and dominance/aggression and between fear and submission/safety (Eder & Rothermund, 2008). Previous studies on the perception of angry and fearful faces did not rule out such interpretations. For instance, the findings of Krieglmeyer and Deutsch (2013) may reflect the activation of a goal (e.g., to aggress another person) in response to a constellation of affairs (e.g., the other is angry), but they may also reflect an (in)compatibility between the stimulus features "angry"/"fearful" and the response features "aggressive"/"peaceful" (Kornblum, Hasbroucq, & Osman, 1990). More specifically, participants may have responded faster with an aggressive response to an angry face and with a peaceful response to a fearful face, because the stimulus features "angry" and "fearful" automatically activated the corresponding (semantically related) response features "aggressive" and "peaceful". To preclude an explanation in terms of pure feature overlap, we examined how the relations between anger/fear and approach/avoidance were qualified by the locus of the feelings: self vs. other. Any difference between two conditions that differ with regard to locus, but that are otherwise entirely equivalent, rules out an explanation in terms of feature overlap alone.

Our experimental paradigm was a variant of the manikin approach/avoidance task of De Houwer, Crombez, Baeyens, and Hermans (2001). This task consists of a series of trials in which participants use a manikin to approach and avoid stimuli. The properties of the stimuli are manipulated and RTs are measured. Our first adaptation was that we manipulated the superordinate goals of approach and avoidance. In one condition, approach was presented as a fight response (instrumental for the goal to dominate/aggress) and avoidance as a flight response (instrumental for the goal to be submissive/self-protect). In another condition, approach was presented as a beg response (instrumental for the goal to be submissive) and avoidance as stubbornly turning the back (instrumental for the goal to dominate/aggress). Our second adaptation was that two manikins appeared on screen, one representing the participant and another representing an opponent, and that the properties of both manikins were manipulated. In one version of the task, we manipulated the feelings of the participant manikin by presenting anger and fear synonyms on this manikin and by instructing participants that these words represented the feelings of their manikin. In another version, the feelings of the opponent were manipulated by presenting anger and fear synonyms on the opponent and by instructing participants that these words represented the feelings of the opponent.

The experiment was a stimulus–response compatibility (SRC) task (De Houwer, 2003; Kornblum & Lee, 1995) with two blocks. In one block (the anger-approach/fear-avoidance block) the instruction was to approach if an anger word appeared and to avoid if a fear word appeared; in another block (the anger-avoidance/fear-approach block) the stimulus–response mapping was reversed. We compared the

performance in these two blocks across four experimental conditions that combined the manipulations of the superordinate goal (fight/flight vs. beg/stubborn) and of the locus of the feelings (self vs. opponent): self-fight/flight, opponent-fight/flight, self-beg/stubborn, and opponent-beg/stubborn.

For the self conditions, we predicted the following SRC effects: in the fight/flight condition, better performance (i.e., faster RTs and fewer errors) in the anger-approach/fear-avoidance block than in the anger-avoidance/fear-approach block; in the beg/stubborn conditions, better performance in the anger-avoidance/fear-approach block than in the anger-approach/fear-avoidance block. This would suggest that the superordinate goals of approach and avoidance determine whether anger is related to approach and fear to avoidance, or the other way around.

For the opponent conditions, we had less clear predictions than for the self conditions. Studies have shown that perceiving angry faces can activate approach (Aarts et al., 2010; Wilkowski & Meier, 2010), avoidance (Marsh, Ambady, & Kleck, 2005; Seidel, Habel, Kirschner, Gur, & Derntl, 2010), or neither (Heuer, Rinck, & Becker, 2007; Roelofs et al., 2010). A reason for these ambiguous results may be that another persons' anger can elicit very different feelings (both anger and fear) in the perceiver. We therefore predicted that anger and fear of the opponent would lead to a less consistent pattern of results than anger and fear of the participant manikin.

It may be noted that a moderation of our results by the locus of the feeling would exclude an interpretation in terms of conceptual *overlap*, but not in terms of conceptual *relations*. It is indeed plausible that a procedure using symbolic stimuli reveals conceptual relations between goal representations (i.e., representations of desired outcomes, Hommel, Musseler, Aschersleben, & Prinz, 2001) and feeling representations (i.e., representations of experienced or perceived feelings) rather than actual relations. These conceptual relations may be formed through experience with actual relations. For instance, the repeated experience that feelings of anger and fear emerge upon the activation of specific super- and subordinate goals may have formed a conceptual relation between these feelings and these goals. In this case, the boundary conditions of the conceptual relations may be equivalent to the boundary conditions of the actual relations. On the other hand, these conceptual relations may also be formed through other means than through experience (e.g., through instruction) and may reflect other relations, such as societal norms. This calls for caution when interpreting the present findings in terms of actual relations.

Method

Participants

All participants were students at Ghent University. Two participants were removed because their error rates deviated more than 3 *SD*s from the mean across conditions. This resulted in 29 participants in the self-fight/flight condition (M_{age} = 18.5, 3 men), 28 in the opponent-fight/flight condition (M_{age} = 18.8, 4 men), 30 in the self-beg/stubborn condition (M_{age} = 18.6, 12 men), and 31 in the opponent-beg/stubborn condition (M_{age} = 20.5, 8 men).

Design

The experimental design consisted of one within-subjects factor: block (anger-approach/fear-avoidance vs. anger-avoidance/fear-approach). There were two between-subjects factors: superordinate goal (fight/flight vs. beg/stubborn) and locus of the feeling (self vs. opponent). The combination of these factors yielded four between-subjects conditions: self-fight/flight, other-fight/flight, self-beg/stubborn, and other-beg/stubborn.

Stimuli and materials

The experiment was programmed and run in Affect 4.0 (Spruyt, Clarysse, Vansteenwegen, Baeyens, & Hermans, 2010). Five anger words (rage, angry, mad, quick-tempered, and irritation) and five fear words (afraid, panic, anxious, fear, and terror) were selected from a pretested list of Dutch words. The sets were matched for valence ($M_{anger} = -1.85$; $M_{fear} = -1.83$; scale from *very negative*, −3, to *very positive*, +3), $t(8) < 1$, $p = .91$, arousal ($M_{anger} = 5.04$; $M_{fear} = 4.84$; scale from *totally not intense*, 1, to *very intense*, 7), $t(8) < 1$, $p = .62$, number of letters/pixels (M_{anger} = 6/31.8; M_{fear} = 5.6/31.4), $t(8) < 1$, $p = .71$/$t(8) < 1$, $p = .89$, and frequency ($M_{anger} = 1.50$; $M_{fear} = 1.66$), $t(8) < 1$, $p = .58$.

A rating study (n = 110) of the responses on five seven-point scales (valence, aggressiveness, hostility, strength, dominance, and self-protectiveness, with the respective anchors *very negative/very positive*, *very sympathetic/very aggressive*, *very friendly/very hostile*, *very weak/very strong*, *very submissive/very dominant*, and *totally not self-protective/very self-protective*) revealed that fighting was perceived as equally negative ($M = 3.96$, $SD = 0.99$) as fleeing ($M = 3.89$, $SD = 0.99$), $F < 1$, but as more aggressive ($M = 5.21$, $SD = 0.95$) than fleeing ($M = 3.65$, $SD = 0.71$), more hostile ($M = 5.21$, $SD = 0.91$) than fleeing ($M = 3.52$, $SD = 0.83$), stronger ($M = 5.76$, $SD = 0.86$) than fleeing ($M = 3.14$, $SD = 0.95$), more dominant ($M = 5.68$, $SD = 0.79$) than fleeing ($M = 2.95$, $SD = 1.01$), and less self-protective ($M = 4.07$, $SD = 1.61$) than fleeing ($M = 5.11$, $SD = 1.26$), $Fs > 19.93$, $ps < .001$. In addition, stubbornly turning the back was perceived as more negative ($M = 3.01$, $SD = 0.98$) than begging ($M = 3.83$, $SD = 1.20$), more aggressive ($M = 4.75$, $SD = 0.71$) than begging ($M = 3.20$, $SD = 0.89$), more hostile ($M = 5.06$, $SD = 0.73$) than begging ($M = 2.85$, $SD = 0.88$), stronger ($M = 3.90$, $SD = 1.36$) than begging ($M = 3.45$, $SD = 1.51$), more dominant ($M = 5.06$, $SD = 0.82$) than begging ($M = 2.09$, $SD = 0.99$), and more self-protective ($M = 4.68$, $SD = 1.15$) than begging ($M = 3.76$, $SD = 1.50$), $Fs > 4.54$, $ps < .05$. Thus, as anticipated, approach was seen as more dominant and more aggressive than avoidance in case of fight/flight responses, whereas approach was seen as less dominant and less aggressive than avoidance in case of beg/stubborn responses. Avoidance (flight/stubbornly turning the back) was, however, always perceived as more self-protective than approach (fight/begging). Thus, we manipulated the instrumentality of approach and avoidance for the superordinate goals to aggress/dominate and to be submissive but not for the goal to self-protect.

Procedure

The experiment was a game consisting of 120 trials divided in two blocks of 60 trials. The blocks differed only with respect to response mapping: anger-approach/fear-avoidance or anger-avoidance/fear-approach. Half of the participants started with the anger-approach/fear-avoidance block, the other half with the anger-avoidance/fear-approach block.

In the fight/flight conditions, participants were instructed to play a game in which they were a fencer whose aim was to obtain a high score in order to become a fencing master (the score was presented in the top center of the screen). They were told that their fencer would meet with an opponent for 120 times and that they had to decide each time to fight or flee based on the feelings of their fencer (self condition) or of the opponent (opponent condition). The rule that participants had to follow in the anger-approach/fear-avoidance block was "if your fencer (/the opponent) is fearful, you have to flee from the opponent; if your fencer (/the opponent) is angry, you have to attack the opponent." The rule in the anger-avoidance/fear-approach block was "if your fencer (/the opponent) is fearful, you have to attack the opponent; if your fencer (/the opponent) is angry, you have to flee from the opponent."

In the beg/stubborn conditions, participants were instructed to play a game in which they were an actor whose task was to acquire a high exam score in order to obtain an acting degree. They were told that they would meet with an opponent for 120 times and had to play having an argument by either begging or stubbornly turning their back based on the feelings of their manikin (self condition) or of the opponent (opponent condition). In the anger-approach/fear-avoidance block, participants followed the rule "if your manikin (/the opponent) is fearful, you have to stubbornly turn your back from the opponent; if your manikin (/the opponent) is angry, you have to beg the opponent." In the anger-avoidance/fear-approach block, participants followed the rule "if your manikin (/the opponent) is fearful, you have to beg the opponent; if your manikin (/the opponent) is angry, you have to stubbornly turn your back to the opponent."

Each trial started with the presentation of a fixation cross for 500 ms in the center of the screen. After the fixation cross had disappeared, the participant manikin appeared on the left or right side of the screen, facing the other side and wearing a black shirt. Only in the self condition, the word "ME" was displayed on the participant manikin. After 500 ms, the opponent (a manikin wearing a purple shirt) appeared on the other side, facing the participant manikin. Only in the opponent condition, the word "HE" was displayed on the opponent. In the fight/flight conditions, the manikins were fencers that both held a saber in horizontal position (see Fig. 1). In the beg/stubborn conditions, the manikins stood up straight with their arms relaxed next to their body (see Fig. 2). After 500 ms, an anger or fear word appeared on the body of the participant's own manikin (replacing the word "ME") in the self conditions, or on the body of the opponent (replacing the word "HE") in the opponent conditions. Participants had 2000 ms to approach or avoid the opponent by pressing the left or right key of a mouse-shaped response box (Voss, Leonhart, & Stahl, 2007) using their index fingers. They could approach by pressing the button in the direction of the opponent (i.e., the right/left button if the opponent was on the right/left side) and avoid by pressing the button away from the opponent (i.e., the right/left button if the opponent was on the left/right side). If the response was correct (according to the instructions of that block), the participant's manikin moved toward or away from the opponent. In the fight/flight conditions, the participant fencer either approached (attacked) the opponent while extending the right arm and touching the opponent with the saber, or avoided (fled from) the opponent by moving backwards while flexing the arm so that the saber pointed upwards (Fig. 1). In the beg/stubborn conditions, the participant manikin either approached the opponent in a begging position (on the knees, folding the hands) or avoided the opponent in a stubborn way (turning the back, folding the arms; Fig. 2). Both approach behaviors (fight and beg) involved the same degree of distance change and so did both avoidance behaviors (flight and turning the back). The approached or avoided manikin and the opponent remained on the screen for 1500 ms before a new trial started. If an incorrect or no response was registered before the deadline, the respective messages "!!!ERROR!!!" or "!!!TOO LATE!!!" appeared in the center of the screen for 300 ms before the next trial started (ITI = 0 ms). Each correct response increased the score by one point. Incorrect responses or responses after the deadline did not affect the score.

Results

Before analyzing the data, we removed all trials with RTs below 150 ms (0.08%) or above 2000 ms (0.24%). For the analysis of the RTs, all trials with errors were additionally removed (7.36%).

RTs

Normality tests of the distribution of difference scores of the average RTs in the anger-approach/fear-avoidance and anger-avoidance/fear-approach blocks indicated no significant deviation from normality (skewness = 0.78; kurtosis = 0.13; $zs < 0.36$, $p > .72$). Average RTs were entered in a repeated measures ANOVA with the within-subjects

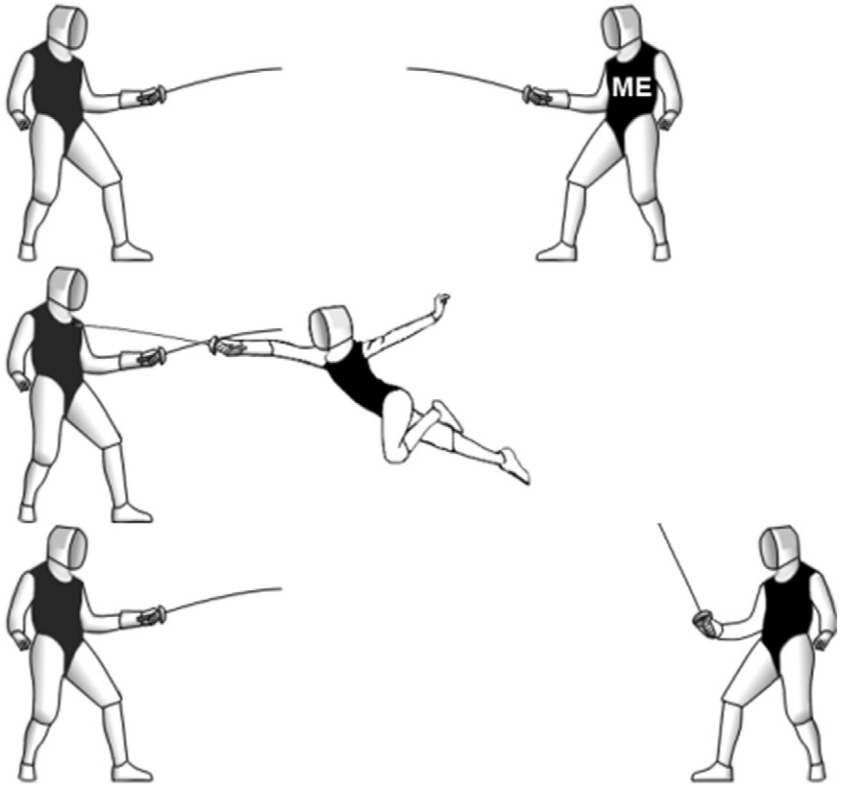


Fig. 1. Manikins of self- and opponent-fight/flight conditions in start position (top), after a correct fight response (middle) and after a correct flight response (bottom). Source: Francois Cartegnie (http://commons.wikimedia.org/wiki/File:Fencing_foil_valid_surfaces.svg#filehistory).

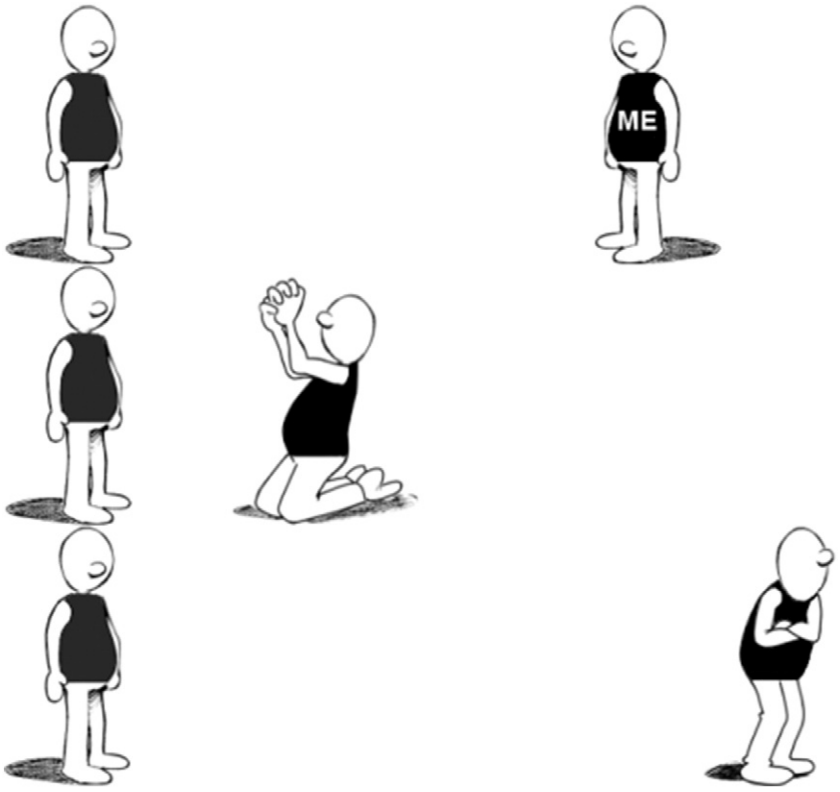


Fig. 2. Manikins of self- and opponent-beg/stubborn conditions in start position (top), after a correct beg response (middle) and after a correct stubborn response (bottom).

factor block (anger-approach/fear-avoidance vs. anger-avoidance/fear-approach) and the between-subjects factors superordinate goal (fight/flight vs. beg/stubborn) and locus of the feeling (self vs. opponent). As predicted, the ANOVA revealed a significant three-way interaction of Block × Superordinate Goal × Locus, $F(1, 114) = 9.39$, $p = .003$ (Table 1). Additionally, we observed an interaction between block and superordinate goal, $F(1, 114) = 34.59$, $p < .001$, and a main effect of block, $F(1, 114) = 22.37$, $p < .001$, but no interaction between block and locus, nor main effects of superordinate goal or locus, Fs < 1. The main effect of block reflected faster responses in the anger-approach/fear-avoidance block ($M = 726$ ms, $SD = 130$) than in the anger-avoidance/fear-approach block ($M = 770$ ms, $SD = 137$). The interactions suggested that the block effect depended on superordinate goal and locus. Simple comparisons revealed an effect of superordinate goal in the self conditions, $F(1, 114) = 40.07$, $p < .001$, and in the opponent conditions, $F(1, 114) = 3.96$, $p = .049$ (Table 1). In the self conditions, we observed the predicted pattern: If approach was a dominant/aggressive response (fighting) and avoidance a submissive/non-aggressive response (fleeing), RTs were faster in the anger-approach/fear-avoidance block than in the anger-avoidance/fear-approach block. On the other hand, if approach was a submissive/non-aggressive response (begging) and avoidance a dominant/aggressive response (stubbornly turning the back), RTs were faster in the anger-avoidance/fear-approach block than in the anger-approach/fear-avoidance block. In the opponent condition, we observed that if approach was a dominant/aggressive response (fighting) and avoidance a submissive/non-aggressive response (fleeing), RTs were faster in the anger-approach/fear-avoidance block than in the anger-avoidance/fear-approach block. In the opponent beg/stubborn condition, there was no significant block effect (Table 1). As predicted, all block effects were more pronounced in the self conditions than in the opponent conditions: $F_{\text{fight/flight}}(1, 114) = 5.21$, $p = .024$; $F_{\text{beg/stubborn}}(1, 114) = 4.20$, $p = .043$.

Table 1
Means (SDs) of the RTs and error percentages of the anger-approach/fear-avoidance block, the anger-avoidance/fear-approach block, and the difference between these blocks for each condition.

	Word location	Experimental block	Approach/avoidance goal			
			Dom./agg. approach–subm. avoidance		Subm. approach–dom./agg. avoidance	
RTs (ms)	Self	Anger-ap./fear-av.	671	(89)	783	(130)
		Anger-av./fear-ap.	807	(124)	744	(120)
		Difference	136	$(89)_a^{***}$	−39	$(100)_c^{*}$
	Other	Anger-ap./fear-av.	730	(146)	719	(129)
		Anger-av./fear-ap.	801	(169)	735	(123)
		Difference	72	$(109)_b^{*}$	17	$(123)_d$
Errors (%)	Self	Anger-ap./fear-av.	3.79	(3.24)	9.83	(6.91)
		Anger-av./fear-ap.	8.51	(5.59)	7.06	(5.44)
		Difference	4.71	$(4.90)_k^{***}$	−2.78	$(7.16)_\iota^{*}$
	Other	Anger-ap./fear-av.	6.37	(6.88)	7.42	(5.21)
		Anger-av./fear-ap.	9.23	(7.35)	6.67	(6.57)
		Difference	2.86	$(10.01)_k^{*}$	−0.75	$(6.28)_\iota$

Note: $^{***}p < .001$, $^{**}p < .01$, and $^{*}p < .05$; block differences marked by different (vs. same) subscripts are (vs. are not) significantly different at the $p < .05$ level.

Errors

Normality tests of the distribution of difference scores of the error percentages in the anger-approach/fear-avoidance and anger-avoidance/fear-approach blocks indicated a deviation from normality in terms of kurtosis (skewness = 0.03; $z < 0.16$; kurtosis = 2.11;

$z = 4.77$, $p < .001$). The same ANOVA was employed as for the RTs.[1] Contrary to the RT data, the three-way interaction Block × Superordinate Goal × Locus failed to reach significance, $F(1, 114) = 2.09$, $p = .15$, and so did the main effect of block, $F(1, 114) = 2.26$, $p = .14$. Confirming the RT data, however, we again observed a significant interaction of Block × Superordinate Goal, $F(1, 114) = 17.11$, $p < .001$, and no main effects of superordinate goal and of locus, $Fs < 1$ (Table 1). Simple comparisons revealed a significant effect of superordinate goal in the self conditions, $F(1, 114) = 15.60$, $p < .001$, and a trend effect in the opponent conditions, $F(1, 114) = 3.96$, $p = .060$. In the self conditions, we replicated the predicted pattern: if approach was a dominant/aggressive response (fighting) and avoidance a submissive/non-aggressive response (fleeing), participants made less errors in the anger-approach/fear-avoidance block than in the anger-avoidance/fear-approach block. On the other hand, if approach was a submissive/non-aggressive response (begging) and avoidance a dominant/aggressive response (stubbornly turning the back), participants made less errors in the anger-avoidance/fear-approach block than in the anger-approach/fear-avoidance block. In the opponent conditions, confirming the RT data, we observed that if approach was a dominant/aggressive response (fighting) and avoidance a submissive/non-aggressive response (fleeing), participants made less errors in the anger-approach/fear-avoidance block than in the anger-avoidance/fear-approach block. Again there was no significant difference between the blocks in the opponent beg/stubborn condition (Table 1). The pattern of error data thus resembled the pattern of the RT data, with the exception that the block differences were not significantly more pronounced in the self conditions than in the opponent conditions: $F_{\text{fight/flight}}(1, 114) = 0.93$, $p = .34$; $F_{\text{beg/stubborn}}(1, 114) = 1.18$, $p = .28$.

Discussion

The present experiment offered support for the idea that approach and avoidance goals in the context of feelings of anger and fear are subordinate goals that are at the service of superordinate goals. We manipulated the instrumentality of approach and avoidance for the superordinate goals to dominate/aggress and to be submissive. We observed that anger was associated with approach and fear with avoidance if approach allowed one to dominate/aggress and avoidance allowed one to be submissive. Conversely, anger was associated with avoidance and fear with approach if avoidance allowed one to dominate/aggress and approach allowed one to be submissive.

In addition, we observed that the location of the feeling words influenced participants' responding. In the self conditions, both the fight/flight and beg/stubborn conditions supported the idea that feelings of anger vs. fear relate to the goals to dominate/aggress vs. be submissive (e.g., Fridlund, 1994; Roseman, 2011). In the opponent conditions, the data pattern was less clear: Angry vs. fearful others facilitated fighting vs. fleeing, consistent with the findings of Krieglmeyer and Deutsch (2013, Study 2) and Wilkowski and Meier (2010, Study 3). In the beg/stubborn condition, however, we obtained no effect. Thus, only in one of the two opponent conditions (fight/flight but not beg/stubborn), angry vs. fearful others seemed to facilitate the goals to dominate/aggress vs. be submissive.

The fact that our results were modulated by the locus of the feeling is important because it excludes the possibility that they were driven exclusively by the overlap between the stimulus features “anger” and “fear” and the response features “fight/stubborn” and “flee/beg”. It does not exclude the possibility, however, that part of our findings can be explained by feature overlap. More specifically, the fact that our effects were systematically weaker in the opponent conditions could indicate that the findings in the opponent conditions were fully caused by feature overlap and that only the surplus in the self conditions stemmed from the type of compatibility that was targeted in our research (i.e., between anger/fear of the self and the superordinate goals to dominate/aggress and to be submissive). Future studies may investigate this issue further by including a condition in which anger and fear words refer to a bystander rather than to the participant manikin or the opponent. If an opponent condition would show stronger effects than a bystander condition, this could not be explained by feature overlap.

A limitation of the present study concerns the relative nature of our findings. Our effects may be produced by the anger words, the fear words, or a combination of the two. To solve this problem, future research may use a design in which anger and fear words are contrasted with neutral words. The risk with such a design, however, might be that participants recode the angry/fearful vs. neutral words as negative vs. neutral or arousing vs. non-arousing and that this eradicates any feeling-specific effects.

Another limitation of our studies is that our samples consisted predominantly of women. We conducted additional analyses to test for sex differences in the conditions that had a sufficient number of males: the beg/stubborn conditions. The three-way interaction between block, locus, and sex for the RTs did not reach significance, $F(1, 57) = 2.31$, $p = .13$, hence there was no evidence for a statistically reliable effect of sex.

A final important limitation of our procedure concerns the manipulation of feeling words rather than actual feelings. The use of symbolic stimuli allows us to draw conclusions about conceptual relations between feelings and goals, which may or may not correspond to actual relations. Our study thus offers indirect support for the idea that the relations between anger and approach and fear and avoidance are modulated by the superordinate goals of approach and avoidance. Future research is needed to establish this modulation when actual feelings of anger and fear are involved. Follow-up studies may induce feelings of anger and fear and then ask participants to perform full-body approach and avoidance movements, such as approaching by kneeling to press a button attached to the floor (i.e., submissive/non-aggressive approach) or by hitting a button attached to the wall (i.e., dominant/aggressive approach). The feelings in these studies may be induced via procedures that are less likely to activate conceptual knowledge (e.g., music) than others (e.g., subliminal word priming or text reading, see Lench, Flores, & Bench, 2011). In this respect, we wish to note that some emotion theories hold that feelings of anger or fear emerge only if one's conceptual knowledge has led one to categorize one's bodily state as angry or fearful (Barrett, 2006). This theoretical position suggests that it is impossible to induce feelings without activating conceptual knowledge.

To summarize, our studies showed that changing the functionality of approach and avoidance for the superordinate goals to dominate/aggress and to be submissive reversed the typical set of relations between anger and approach and between fear and avoidance. This supports the idea that approach and avoidance in the context of anger and fear are at the service of these superordinate goals.

[1] A non-parametric test (Leys & Schumann, 2010) produced similar results.

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