

Aggressive primes can increase reliance on positive and negative thoughts affecting self-attitudes

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ABSTRACT

Past research has shown that exposure to aggression is associated with more negative responses toward others and also toward the self. In the present research, we argue that aggressive priming not only influences the content of thoughts (primary cognition) but also can influence how people think about their thoughts (secondary or meta-cognition) under some circumstances. Two experiments showed that the effect of the direction of thoughts (positive vs. negative) on self-evaluation was greater after receiving an aggressive (vs. control) priming induction. Among participants listing negative self-attributes, those in the aggressive (vs. control) prime condition reported more negative self-attitudes. However, among participants listing positive traits, the aggressive (vs. neutral) primes led to more favorable self-attitudes, reversing traditional effects of aggression on self-evaluation.

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In this manuscript we examine the possibility that aggressive states can lead people to rely on their own thoughts in forming self-evaluations. We first review the literature showing a connection between exposure and aggressive acts and aggressive thoughts toward others and toward oneself. Most of that work reveals that exposure to aggressive acts influences the content of primary thoughts when the exposure occurs before information processing. Primary thoughts are those that occur at a direct level of cognition and involve a person's initial associations of an object with some attribute (e.g. I am smart). Then, we introduce the self-validation hypothesis and provide a rationale for why exposure to aggressive primes could magnify the impact of primary thoughts on judgments by enhancing confidence in those thoughts. The confidence with which people hold their thoughts is considered a secondary or a meta-cognition because it refers to a dimension of cognition that involves thinking about one's primary thoughts (e.g. I am sure that I am smart; Briñol & DeMarree, 2012; Jost, Kruglanski, & Nelson, 1998; Petty, Briñol, Tormala, & Wegener, 2007).

The specific proposition relevant to the current research is that mental states and facial expressions associated with aggression can lead people to increase their reliance on their own thoughts via a meta-cognitive mechanism called self-validation by which people become more confident in their thoughts (Briñol & Petty, 2009; Petty, Briñol, & Tormala, 2002).

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As we describe shortly, this proposition is based on the link between aggression and a number of potential variables associated with confidence, ranging from power to readiness to anger and arousal.

Aggression and primary cognition

Exposure to aggressive acts has been found to increase aggressive thoughts, feelings, and evaluations about others (Anderson & Bushman, 2002; Berkowitz & LePage, 1967; Boxer, Huesmann, Bushman, O'Brien, & Mocer, 2009; Calvete & Orue, 2012). For example, Anderson (1997) showed that participants exposed to aggressive film clips reported higher levels of hostility than people who had seen a non-aggressive film clip (see also, Ferguson, 2011, 2015; Ferguson & Kilburn, 2009, 2010; McCarthy, Coley, Wagner, Zengel, & Basham, 2016). Similarly, several correlational studies support the association between aggressive experiences and negative evaluations of oneself (Copeland-Linder, Lambert, & Jalongo, 2010; Gorman-Smith & Tolan, 1998; Mendelson, Turner, & Tandon, 2010; Sigfusdottir, Farkas, & Silver, 2004; Wilson & Rosenthal, 2003). A theoretical framework that has been proposed to understand these effects of exposure to aggression is based on the concept of an "aggressive script" (Schank & Abelson, 1977). The formation of aggressive scripts is postulated to begin as soon as children have developed a basic understanding of the meaning of aggressive behavior and its consequences. These scripts are then extended and elaborated as a function of direct and vicarious experiences related to aggression. Due to the associations in this script, experiences of aggression automatically trigger aggressive thoughts.

In sum, the available literature shows that exposure to aggression is associated with negative thoughts and attitudes toward others and the self. Uhlmann and Swanson (2004) suggested that one way in which exposure to aggression exerts an influence on the thoughts that come to mind is via changes in a person's automatic self-concept. This idea is consistent with the Active-Self account of prime to behavior effects (DeMarree, Wheeler, & Petty, 2005) which suggests that exposure to behaviors, stereotypes, and other social constructs can alter the self-representations that are activated in way consistent with the primed constructs. As a consequence, that change in the active self-concept can also influence self-evaluations as well as actions.

Aggression and meta-cognition

We propose that not only can exposure to aggressive primes influence one's primary cognitions as reviewed above, but aggressive primes can also be associated with increased reliance on one's thoughts. This increased reliance can then determine the extent to which a person's primary thoughts have an impact on their judgments. As explained earlier, this notion stems from the *self-validation hypothesis* which holds that in addition to the content of one's primary thoughts, it is also necessary to understand how confident people are in their thoughts or how much they like their thoughts in order to understand the impact of these thoughts on judgment (Petty et al., 2002). In general, people will use their primary thoughts more in forming judgments the more people have confidence in their thoughts.

According to the self-validation framework, any variable that increases confidence in thoughts is likely to increase reliance on those thoughts in determining attitudes. Thus, increased meta-cognitive confidence in favorable thoughts toward the self will result in

more positive self-attitudes, whereas increased meta-cognitive confidence in unfavorable thoughts regarding the self will result in less self-positive attitudes. The meta-cognitive confidence people have in their thoughts can stem from several different variables (see Briñol & Petty, 2009, for a review).

In one example study applying self-validation to self-evaluation (Briñol & Petty, 2003, Experiment 4), participants were asked, as part of an ostensible graphology study, to think about and write down their best or worst qualities using their dominant or non-dominant hand. Then, participants reported their self-esteem. Because writing with the non-dominant hand is difficult and shaky, whereas writing with the dominant hand is quite easy and clear, it was expected and found that using the non-dominant hand decreased the meta-cognitive confidence in the thoughts that were listed. As expected, the effect of the best or worst qualities manipulation on state self-esteem was significantly greater when participants wrote their thoughts with their dominant rather than non-dominant hand. That is, writing positive thoughts about oneself with the dominant hand increased self-esteem relative to writing positive thoughts with the non-dominant hand, but writing negative thoughts with the dominant hand reduced self-esteem relative to writing with the non-dominant hand.

In another experiment illustrating the possibility of changing self-evaluations through meta-cognitive processes, Briñol, Petty, and Wagner (2009) asked participants to think about and write down their best or worst qualities while sitting with their backs erect, pushing their chests out (i.e. a confident posture) or while sitting slouched forward with their backs curved (i.e. a doubtful posture; Huang, Galinsky, Gruenfeld, & Guillory, 2011). Then, participants completed a number of measures, including self-esteem. In line with the self-validation hypothesis, it was predicted and found that the thoughts generated about the self only affected self-attitudes in the confident posture. Thus, the effect of the direction of thoughts on self-esteem was greater when participants wrote their thoughts in the confident rather than the doubtful body posture (for additional examples of validation in the context of self-related thoughts, see Briñol, DeMarree, & Petty, 2010, 2015). The results of other studies on embodiment are consistent with the idea that, compared with confident body positions, other more supine, horizontal, submissive positions might introduce some doubts in what people have in mind at the time (Harmon-Jones & Peterson, 2009; Harmon-Jones, Price, & Harmon-Jones, 2015).

In closing this section, it is important to note that for this meta-cognitive self-validation process to occur, prior research has established two important boundary conditions. First, self-validation is more likely to operate when people are engaged in a relatively high amount of thinking (e.g. for important issues like self-evaluation), and when the experience of confidence (e.g. induced by aggressive primes) seems to follow rather than precede thought generation. The two studies of this report meet these two criteria. Specifically, in this research participants were first asked to generate thoughts about the self, and were then exposed to aggressive or neutral primes. Finally, they were asked to evaluate themselves. As explained further next, the self-validation hypothesis is that aggressive primes will lead to a greater reliance on the direction of thoughts when forming self-attitudes than non-aggressive primes.

Aggressive states can validate thoughts

The specific proposition relevant to the current research is that mental states and facial expressions associated with aggression can lead people to increase their reliance on their

own thoughts as predicted by the self-validation approach. This proposition is based on the link between aggression and a number of variables associated with confidence.

First, there is a link between aggression and power. Aggression can give people the potential to control others. Merely threatening others with an attack can control them and give the attacker a sense of confidence. In part because threatening others with aggression is putting oneself in a position of power, we argue that mental and physical states associated with attack can lead people to increase feelings of confidence and thus reliance on their own thoughts. This idea is consistent with previous research revealing that aggressive individuals enjoy the benefits associated with being seen as a high status, powerful person (Cillessen & Mayeux, 2004; Rodkin, Farmer, Pearl, & Van Acker, 2000; Vaillancourt & Hymel, 2006). Furthermore, the bullying literature characterizes the phenomenon of aggression as an imbalance of power that the aggressor exerts over the victim (Arenas, León-Pérez, Munduate, & Medina, 2015; Pepler et al., 2006; Rodkin, Espelage, & Hanish, 2015; Volk, Dane, & Marini, 2014). Not only is aggression linked to perceived power, but inductions of perceived power have led people to rely more on their thoughts (Briñol, Petty, Valle, Rucker, & Becerra, 2007; DeMarree, Briñol, & Petty, 2014; DeMarree et al., 2012).

Second, in addition to power, mental and physical states associated with aggression involve physiological arousal (Anderson & Bushman, 2001; Anderson et al., 2003). For example, meta-analytic reviews found that playing aggressive videogames can increase arousal (Anderson et al., 2010; Carnagey, Anderson, & Bushman, 2007; Greitemeyer & Mugge, 2014). Importantly, as was the case with power, a number of studies have shown that an increase in arousal can magnify the effect of any thought previously activated in peoples' minds, polarizing subsequent judgments (e.g. Stangor, 1990; Storbeck & Clore, 2008; Zajonc, 1965).

Third and partially related to the previous points, aggression involves a state of readiness. Thinking and acting as if one is ready to attack can automatically activate the primitive, inborn response that prepares the body to fight (e.g. Blanchard, Hynd, Minke, Minemoto, & Blanchard, 2001; Jamieson, Valdesolo, & Peters, 2014). Survival and adaptation demand the resolution of competing action tendencies into a single unequivocal behavioral orientation that maximizes readiness to respond to challenges and threats in the environment. This readiness to respond is necessary for organisms in preparation to attack. Thus, because the primitive "fight or flight" response requires that people resolve these competing action tendencies, pursuing one of these should be associated with confidence (Buss & Duntley, 2006). Indeed, in order to fight, people need to have confidence and rid themselves of doubt (e.g. Carroll, Arkin, & Shade, 2011; Keltner, Gruenfeld, & Anderson, 2003; Santos & Rivera, 2015). In sum, because fight responses often stem from appraisals that one can overcome the threat, it is reasonable that preparation to fight should lead to increased confidence and greater reliance on one's thoughts.

Finally, inductions of aggression can be associated with emotions such as anger (Anderson, 1997; Bushman & Anderson, 2002; Ramírez & Andreu, 2006). Importantly, anger is associated with the appraisal of certainty (Ellsworth & Smith, 1988; Lerner & Keltner, 2000; Moors, Ellsworth, Scherer, & Frijda, 2013; Smith & Ellsworth, 1985; Tiedens & Linton, 2001). In line with appraisal theories of emotion, several authors have pointed out that anger is associated with self-assurance and confidence (Blankenship, Nesbit, & Murray, 2013; Harmon-Jones, Schmeichel, Mennitt, & Harmon-Jones, 2011; Veling, Ruys, & Aarts, 2011). Indeed, because anger is one of the strongest associations with aggression, and anger is associated with confidence, we assessed it in our studies to see if it was responsible for any validation effects

observed or whether aggressive primes could still produce self-validation effects in the absence of anger. Furthermore, because other emotions such as happiness have also been found to increase reliance in thoughts in a self-validation paradigm (Briñol et al. 2007; Huntsinger, 2013), we also assessed reported happiness in the current research to ensure that the non-aggressive control condition did not reduce happiness compared to the aggressive prime condition.

In sum, we propose that mental and physical strategies associated with aggression or with being ready to attack can influence self-attitudes by validating thoughts due to their link with power, arousal, preparedness, overcoming threats, and/or anger. The aggressive primes used in the present studies had the potential to validate thoughts due to any of these features relevant to confidence. As noted, if the felt confidence from inductions associated with aggression is applied to one's thoughts, it would lead to greater use of those thoughts in forming self-evaluations.

Overview

In the present research, we propose that priming aggression can lead people to increase the reliance on their own thoughts. We hypothesized that, under some circumstances, most forms of aggression can shape self-attitudes by affecting the use of the thoughts that come to mind when people are thinking about themselves. Thus, when the thoughts about the self are primarily favorable, increasing reliance on them through priming of aggression should lead to more favorable self-attitudes. However, when thoughts are primarily unfavorable toward the self, increasing reliance on them should lead to less favorable self-attitudes. Thus, aggressive primes should interact with thought valence in determining self-evaluations. In addition, valenced thoughts should be more predictive of self-attitudes in the aggressive prime than in the control condition. The enhanced correlation is a sign of increased thought use.

In the current paradigm, we varied whether participants were asked to think about their best or worst qualities in order to vary whether positive or negative thoughts were mentally accessible. Then we manipulated either a mental state (Experiment 1) or a facial expression (Experiment 2) associated with aggression. Finally, we measured the impact of the initially generated thoughts on self-evaluations as a function of the aggression induction and also examined the extent to which valenced thoughts predicted self-attitudes. We expected priming aggression to be associated with an increased reliance on one's thoughts in determining self-evaluation.

Experiment 1

In Experiment 1 we varied whether participants were asked to think about their best or worst qualities in order to vary whether positive or negative thoughts were mentally accessible. As part of this thought-direction manipulation, participants had to list three positive or negative self-attributes relating to their future professional careers. Then, either an aggressive experience was made salient by asking participants to write about a time during which they wanted to respond aggressively toward somebody else (aggressive prime group) or the participants were asked to write about their activities on an average day during the previous week (neutral prime group). The aggressive prime manipulation came after participants had

already listed their self-relevant thoughts, precluding the possibility that the aggressive prime could affect the content or quality of participants' self-relevant thoughts. Following the aggressive prime manipulation, participants reported their self-attitudes as job candidates for the professional market. Finally, we assessed anger and happiness as explained earlier, and we also coded the thoughts they listed for affect as well to ensure that the thoughts in the aggressive and control prime groups were equally affect-laden.

Method

Participants and design

Seventy-eight undergraduate students (female 42, male 36; $M_{\text{age}} = 18.82$, $SD = 1.38$; Asian 7, Black or African American 5, White/Caucasian 66) at Ohio State University were randomly assigned to the cells comprising a 2 (Thought Direction: Positive vs. Negative) \times 2 (Prime: Aggressive vs. Neutral) between-subjects factorial design. Sample size was determined simply based on the number of participants who were collected from the start of the study until the end of the academic semester with the anticipation that at least 20 participants per cell would be available.¹

Procedure

Upon entering the laboratory, participants were seated at individual computer stations and told that all experimental procedures would be carried out electronically. Participants were then told that they were taking part in two separate research projects, one organized by the Business School and the other by the Cognitive Science Department. According to the cover story, the Business School was interested in investigating factors contributing to job satisfaction and professional performance. This topic has been shown to be of relatively high personal relevance for students. In completing this project, participants were asked to list three positive or three negative qualities that they believed they possessed as potential job candidates.

After describing their qualities, participants moved on to the second project in the experimental session, in accord with the cover story. Specifically, the Cognitive Science Department was said to be examining the nature of prototypical situations that individuals may encounter on a regular basis. In the aggressive experience condition, participants were asked to describe a recent occasion during which they thought or acted aggressively toward somebody. They were given a blank text box and asked to write for a few minutes, describing the situation in careful and objective detail. Participants in the neutral condition were asked to write about the events they encountered on an average day during the previous week. Finally, participants completed all dependent measures and were debriefed, thanked, and dismissed.

Independent variables

Thought direction

Participants were provided with three boxes to write either three positive or three negative personal traits related to their future professional performance. They could use as many words as they needed to describe their characteristics. All participants were told that this

was an important task and were asked to think carefully as they generated their traits. Previous research has shown that this is an effective way to create different profiles of thoughts (see Briñol & Petty, 2003; Killea & Johnson, 1998). This manipulation served to produce one group with favorable thoughts and another with unfavorable thoughts toward the self as a job candidate. The benefit of the procedure used is that it holds the number and valence of participants' thoughts constant across the prime conditions, as the prime comes after the thought-listing task, and allows for a test of the extent to which people use their thoughts in forming different judgments about themselves.

Prime induction

Consistent with the cover story, participants were told that the Cognitive Science Department wished to explore the nature of prototypical daily situations. Thus, participants were asked to write a brief essay describing a situation in which they had aggressive thoughts or actions toward another person or to write a brief essay describing the events of an average day in the past week. Examples of the essay content in the aggressive prime condition included situations such as attacking in order to practice fighting skill (e.g. martial arts), acting aggressively during the course of a competitive sporting event, or showing off in front of others. Asking people to recall past autobiographical memories can activate similar patterns of thoughts and physiological responses as the original recalled events (Pezdek & Salim, 2011). In the control condition, examples of essay content included more mundane situations such as going to college, drinking beers with a friend or spending time with family.

Dependent measures

Attitudes

The primary dependent measure was attitude toward the self as a potential professional. This dependent measure was assessed using four items, which possessed high internal reliability ($\alpha = .75$). The items were averaged to form an index. These items asked participants to rate, on 9-point scales, the extent to which they believed themselves to be (a) a good vs. bad candidate for the job market, (b) would have good vs. bad future performance on-the-job, (c) become a fulfilled vs. unfulfilled future employee and (d) were favorable vs. unfavorable to themselves as a job candidate.

Emotion assessment

Anger and happiness measures were included at the end of the session, which assessed the extent to which the aggressive manipulation primed anger (i.e. in the case of attacking) or happiness (i.e. thinking about acting aggressively might have unintentionally primed athletic competition, which may have in turn primed positive experiences given that athletic activities are associated with fun and leisure). Or, thinking about a typical day might have involved boring activities making it inadvertently less happy than the aggressive prime condition. First, we asked participants to think back to the essay they had written about the "prototypical" situation (e.g. aggressive vs. control). Then, we asked participants to report, on 6-point scales (1 = *not at all*, 6 = *very much*), the extent to which writing about that situation made them feel angry and the extent to which the situation they described involved happy events, which presumably would make them feel happy.

Thoughts

To examine possible differences in thought content as a function of thought direction and aggressive prime, two independent judges coded participants' thoughts with regard to valence (i.e. extent of positivity/negativity) ($r = .97$), and perceived affectivity (i.e. amount of perceived affect elicited by each thought) ($r = .57$).

Results

Attitudes

A 2 (Prime: Aggressive vs. Neutral) \times 2 (Thought Direction: Positive vs. Negative) ANOVA showed the predicted interaction of thought direction with aggressive prime, $F(1, 74) = 7.58, p < .01, \eta_p^2 = .093$. As illustrated in Figure 1, participants in the aggressive group, those listing positive self-attributes reported significantly more favorable self-attitudes ($M = 7.64, SD = 1.11$) than did those listing negative self-attributes ($M = 6.67, SD = 1.09$), $F(1, 74) = 9.27, p < .01, \eta_p^2 = .111$. For those in the neutral condition, however, those listing positive self-attributes did not report significantly different self-attitudes than did those listing negative self-attributes, $F(1, 74) = .85, p = .36, \eta_p^2 = .011$.

Viewed differently, among participants listing positive self-attributes, there was a marginal difference for those in the aggressive condition ($M = 7.64, SD = 1.11$) to report more favorable self-attitudes than did those in the neutral condition ($M = 7.07, SD = .87$), $F(1, 74) = 3.25, p < .08, \eta_p^2 = .042$. Among those listing negative self-attributes, those in the aggressive condition ($M = 6.67, SD = 1.09$) reported significantly less favorable self-attitudes than did those in the neutral condition ($M = 7.38, SD = 1.00$), $F(1, 74) = 4.34, p = .041, \eta_p^2 = .055$. There were no main effects for thought direction, $F(1, 74) = 1.98, p = .16, \eta_p^2 = .026$, or aggressive prime, $F(1, 74) = .09, p > .75, \eta_p^2 = .001$.

Emotion assessment

The anger measure revealed no main effect of aggressive prime condition, no main effect of thought direction, and no prime \times thought direction interaction, $F_s < 1, ns, \eta_p^2s < .009$. Thus, this suggests that the aggressive prime induction did not work because it primed

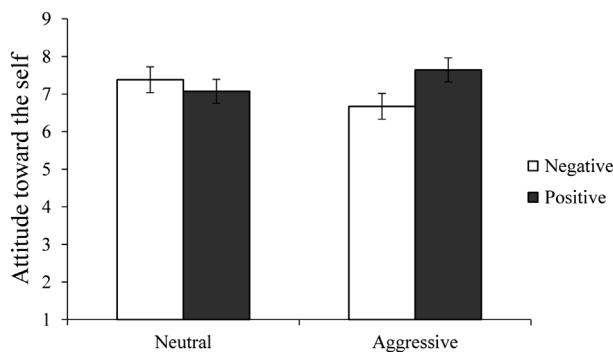


Figure 1. Attitudes toward the self as a function of thought direction and aggressive prime. Higher numbers indicated more favorable self-attitudes ranged from 1 to 9. Error bars represent standard error.

anger. Furthermore participants judged their stories to include more “happy” information when they wrote about neutral events ($M = 3.59$, $SD = 1.26$) than when they wrote about attacking another person ($M = 2.80$, $SD = 1.21$), $F(1, 74) = 7.82$, $p < .01$, partial $\eta^2 = .096$. This finding argues against the possibility that the aggressive condition primed happiness or positive experiences which validated thoughts (Briñol, Petty, & Barden, 2007), and also argues against the possibility that the neutral condition produced less happiness than the aggressive prime condition and thereby invalidated thoughts. There was no significant main effect of thought direction and no attack prime \times thought direction interaction for the happy content manipulation check item, $F_s < 1$, ns , partial η^2 s $< .003$.

Thoughts

The analyses on thoughts revealed a main effect of the thought direction manipulation on thought favorability, $F(1, 74) = 670.10$, $p < .001$, $\eta_p^2 = .901$. As expected if participants followed instructions, their thoughts were judged to be more favorable in the positive ($M = 4.39$, $SD = .27$) than in the negative ($M = 2.09$, $SD = .48$) thoughts condition. There were no other significant effects, $ps > .33$. Related to the extent of perceived affectivity, there were no main effects of the thought direction or prime and no interaction among the variables, $ps > .50$.

Thought-attitude linkage

Regressing attitudes onto the relevant variables, a significant interaction emerged between the thought favorability index and the prime, $B = .43$, $t(74) = 2.19$, $p = .03$. Consistent with the self-validation prediction, this interactive pattern revealed that participants’ valenced thoughts were more closely associated with attitudes when participants were in the aggressive prime condition ($B = .39$, $t(74) = 3.08$, $p = .002$) than when they were in the neutral prime condition ($B = -.04$, $t(74) = -.24$, $p = .81$) suggesting that the aggressive prime condition enhanced thought use.

Discussion

The results of Experiment 1 showed that the effect of thought direction on self-related attitudes was greater for participants in the aggressive prime group than participants in the neutral prime group. This supports our hypothesis that people will rely on their thoughts more when they experience aggressive responses than in neutral situations. As a consequence of this increased reliance on thoughts, among those who listed positive self-attributes, those in the aggressive condition tended to report more favorable self-attitudes than did those in the neutral condition. However, among participants listing negative self-attributes, those in the aggressive condition reported less favorable self-attitudes than did those in the neutral condition. Furthermore, consistent with the self-validation interpretation, the results of the first study showed that there was more consistency between the favorability of thoughts and self-attitudes in the aggressive compared to the neutral prime condition.

In order to replicate and extend these findings, a second experiment was designed but using a different induction associated with aggression. Whereas in Experiment 1 we used a direct, cognitive-based induction of an aggressive orientation (i.e. think about an aggressive memory), in Experiment 2 we used a subtle induction of aggressive experience with an

embodiment manipulation (i.e. aggressive facial pose associated with readiness to attack). As noted, past research has shown that people's bodily responses can also influence the extent to which they use their thoughts in forming evaluations, such as when people push their chests out (vs. curve their backs) or when they use their dominant (vs. non-dominant) hand, they are more likely to use their thoughts (Briñol & Petty, 2003; Briñol et al., 2012).

Experiment 2

We postulate that making an aggressive facial expression can increase reliance on thoughts compared to making a less aggressive facial expression. As noted in the introduction, there are a number of reasons for this that we will not review again. However, it is important to note that just as individuals showing their canine teeth often look as if they are sure about what they are about to do (i.e. bite/attack/threaten), subjectively experiencing an aggressive facial expression might likewise activate reliance. In short, we hypothesize that placing one's face in an aggressive pose as if ready to fight will enhance confidence and reliance on thoughts which will lead those thoughts to have a greater impact on judgments.

Similar to Experiment 1, participants were asked to think about their best or worst qualities in order to vary whether positive or negative thoughts were mentally accessible. This time, however, participants were asked to write these self-relevant thoughts while raising their upper lips and showing their canine teeth (i.e. aggressive expression) or while forming an oval with their lips and covering their teeth (i.e. control neutral expression). Finally, all participants rated themselves as job candidates, and reported their emotions. In addition to measuring anger again, in this study, we also asked participants a more direct question about happiness, and to report their level of alertness since aggression primes might involve readiness (e.g. because the primitive "fight or flight" response prepares organism to respond without doubts; Blanchard et al., 2001; Buss & Duntley, 2006; Storbeck & Clore, 2008).

Method

Participants and design

Seventy-one undergraduate students (female 47, male 24; $M_{\text{age}} = 19.49$, $SD = 4.19$; Asian 3, Black or African American 6, White/Caucasian 60) at Ohio State University were randomly assigned to the cells comprising a 2 (Thought Direction: Positive vs. Negative) \times 2 (Facial Expression: Aggressive vs. Neutral) between-subjects factorial design. A power analysis was conducted based on the key interaction effect size obtained in Experiment 1 (Cohen's $f = .32$) and in previous research on the job candidate paradigm (Briñol & Petty, 2003; Briñol et al., 2009). Analyses were conducted using *G*Power* (Faul, Erdfelder, Lang, & Buchner, 2007) entering the interaction average effect size across studies (Cohen's $f = .34$). Results of this analysis conclude that the desired sample size for a two-tailed test ($\alpha = .05$) with .80 power is $N = 70$.

Procedure

Upon entering the laboratory, participants were seated at individual computer stations and told that all experimental procedures would be carried out electronically. Participants were then told that they were taking part in two separate research projects, one organized by the

Business School and the other by the School of Arts. According to the cover story, the Business School was interested in investigating factors contributing to job satisfaction and professional performance. This topic has been shown to be of relatively high personal relevance for students. The School of Arts was said to be examining the motor skills required to portray another person as an actor or actress, which included the ability to maintain a specific facial expression while engaging in other cognitive activities. Thus, participants were asked to enact a particular facial expression while simultaneously listing positive or negative self-attributes related to their potential professional success. Finally, participants relaxed their facial muscles, completed all dependent measures, and were debriefed, thanked, and dismissed.

Independent variables

Facial expression

Consistent with the cover story, participants were told that the School of Arts wished to determine the factors contributing to individuals' acting ability. Thus, participants were asked to adopt a particular facial expression, while thinking and listing their self-attributes. Participants were asked to raise their upper lips and show their upper teeth (aggressive expression), or to cover their teeth with their lips (neutral expression).

Importantly, this facial expression of aggressiveness can be differentiated from facial expressions of happiness and anger. Participants in this aggressive expression condition were asked to raise their upper lips and show their upper teeth. In contrast, in the facial expression of happiness, the mouth is drawn back at corners. This is important because emotions such as happiness (Briñol et al., 2007) and facial poses such as smiling (Paredes, Stavrakaki, Briñol, & Petty, 2013) can both increase reliance on thoughts. Also, in the traditional facial expression of anger, the mouth is compressed, tightening the lips while the jaw tends toward clenching, the eyes are wide open and the brows are furrowed. Although we did not find a relationship between the aggressive prime and reported anger in study 1, it is important to note that the facial expression of aggression used in the present study can be differentiated from facial expressions of anger.

Thought direction

Participants were asked to first think either three positive or three negative personal traits related to their future professional performance. Then, while maintaining their "aggressive" or neutral facial expressions, they were asked to type their traits using the computer keyboard. Thus, participants were first asked to generate the thoughts and then adopt the facial pose prior to typing those thoughts in the computer. This manipulation of thought direction was identical to the previous experiment, and served to produce one group of participants with favorable thoughts and another with unfavorable thoughts toward the self as a job candidate. In this procedure the number and valence of thoughts requested of participants is held constant within facial expression condition, and allows us to test whether people use their thoughts in forming different judgments.

Dependent measures

Attitudes

The primary dependent measure was attitude toward the self as a potential professional. This dependent measure was assessed using the same four items used in the previous

experiment (9-point scales). These items possessed high internal reliability ($\alpha = .80$) and were averaged to form an index of attitude toward themselves as job candidates.

Emotion assessment

As participants were asked to adopt the particular facial expression while they were writing their thoughts as a job candidate, we included measures about how they had felt while they were listing their self-attributes. Specifically, we asked participants to report on 9-point scales to what extent they felt happiness, angry or alertness.

Thoughts

Because in this study the thoughts were written while in the facial pose, it is possible that the extremity or length of thoughts could have been affected by the pose. Although we did not predict any difference in the length or content of participants' thoughts as a function of facial expression, to examine possible differences in thought content, two independent judges coded participants' thoughts with regard to valence (i.e. extent of positivity/negativity) ($r = .92$), length (i.e. number of words written for each thought) ($r = .99$), abstraction (i.e. whether the thoughts mentioned concrete examples or abstract traits) ($r = .87$) and perceived affectivity (i.e. amount of perceived affect elicited by each thought) ($r = .64$).

Results

Attitudes

A 2 (Facial Expression: Aggressive vs. Neutral) \times 2 (Thought Direction: Positive vs. Negative) ANOVA showed the predicted interaction of thought direction with facial expression, $F(1, 67) = 7.35, p < .01, \eta_p^2 = .099$. As illustrated in Figure 2, this interaction revealed that thoughts influenced attitudes among participants in the aggressive expression group, $F(1, 67) = 7.42, p < .01, \eta_p^2 = .10$, to a greater extent than those in the neutral expression group $F(1, 67) = 1.25, p = .26, \eta_p^2 = .018$. Furthermore, in contrast to theories that might expect a negative expression to invariably produce more negative judgments, participants with positive thoughts saw themselves more favorably when making an aggressive ($M = 7.79, SD = .88$) than when making a neutral ($M = 6.89, SD = .72$) expression, $F(1, 67) = 6.40, p < .02, \eta_p^2 = .087$. Among participants with negative thoughts, the aggressive expression led to less favorable

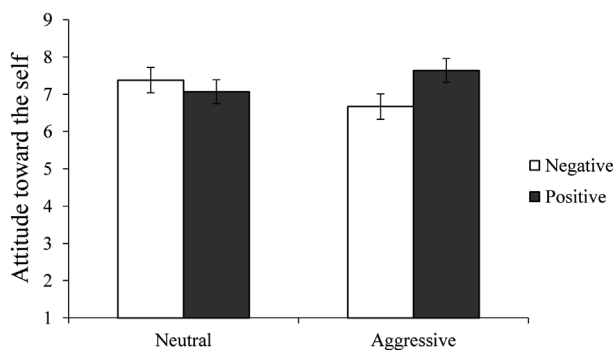


Figure 2. Attitudes toward the self as a function of thought direction and facial expression. Higher numbers indicated more favorable self-attitudes ranged from 1 to 9. Error bars represent standard error.

attitudes ($M = 6.78$, $SD = 1.54$) than the neutral expression ($M = 7.31$, $SD = 1.21$), although this effect was not significant, $p = .18$, $\eta_p^2 = .027$. There were no main effects for thought direction, $F(1, 67) = 1.26$, $p > .27$, $\eta_p^2 = .018$, or facial expression, $F < 1$, ns , $\eta_p^2 < .01$.

Emotion assessment

There was a marginal main effect of thought direction on the happiness measure, $F(1, 67) = 3.60$, $p = .062$, $\eta_p^2 = .051$; revealing that those who listed positive qualities tended to feel more happiness ($M = 6.62$, $SD = 1.46$) than those in the negative qualities condition ($M = 5.97$, $SD = 1.33$). There was also a marginal main effect of thought direction on the alertness measure, $F(1, 67) = 2.92$, $p = .09$, $\eta_p^2 = .042$, such that those in the positive qualities condition tended to show greater alertness feelings ($M = 6.10$, $SD = 1.97$) than those in negative qualities condition ($M = 5.28$, $SD = 2.02$). More importantly, there were no differences in happiness, anger or alertness measures as a function of facial expression, $F_s < 1$, $p_s > .49$, $\eta_p^2_s < .008$. There also were no significant interactions between thought direction and facial expression, $F_s < 2.04$, $p_s > .16$, $\eta_p^2_s < .030$.

Thoughts

The analyses on thoughts revealed a main effect of the thought direction manipulation on thought favorability, $F(1, 67) = 356.60$, $p < .001$, $\eta_p^2 = .84$. Demonstrating that participants followed instructions, their thoughts were judged to be more favorable in the positive ($M = 3.85$, $SD = .29$) than in the negative ($M = 2.24$, $SD = .42$) thoughts condition. Related to the effect of thought direction on length of thoughts, negative thoughts were written with more words ($M = 5.11$, $SD = 5.26$) than the positive thoughts ($M = 2.86$, $SD = 2.32$), $F(1, 67) = 5.69$, $p = .02$, $\eta_p^2 = .078$. Additionally, participants in the positive thoughts condition wrote thoughts that were significantly more abstract ($M = 2.64$, $SD = .40$) than did participants in the negative thoughts condition ($M = 2.29$, $SD = .70$), $F(1, 66) = 7.22$, $p < .01$, $\eta_p^2 = .099$. There was no effect of thought direction on perceived affectivity, $F(1, 67) = .15$, $p = .70$, $\eta_p^2 = .002$. More importantly, there were no differences in the valence, length, abstractness or perceived affectivity of participants' thoughts as a function of facial expression, $F_s < 1.67$, $p_s > .20$, $\eta_p^2_s < .025$. There also were no significant interactions between thought direction and facial expression, $F_s < 1.69$, $p_s > .19$, $\eta_p^2_s < .025$.

The absence of effects is relevant because it rules out potential alternative explanations, including the possibility that participants in the aggressive expression generated more extreme or affective thoughts than did participants in the neutral expression condition. Even though both facial expression groups produced the same valenced thoughts, the pattern of self-evaluation was quite different as a function of facial expression differences.

Thought-attitude linkage

Finally, we predicted that participants in the aggressive condition would rely more on their thoughts in expressing their attitudes than participants in the neutral condition. Regressing attitudes onto the relevant variables, a marginally significant interaction emerged between the thought favorability index and the facial expression, $B = .57$, $t(67) = 1.86$, $p = .06$. Consistent with the self-validation prediction, this interaction pattern revealed that

participants' thoughts tended to be more closely associated with attitudes when participants made an aggressive facial expression ($B = .51$, $t(67) = 2.34$, $p = .02$) than when they made a neutral facial expression ($B = -.06$, $t(67) = -.29$, $p = .77$).

Discussion

In line with the self-validation hypothesis, we found that the effect of the direction of thoughts on self-related attitudes was greater when participants made an aggressive face than when participants made a neutral expression. Thus, with an aggressive facial expression, participants seemed to rely on their thoughts in forming their self-attitudes more so than did participants performing a more neutral facial expression. In fact, thoughts were more closely associated with attitudes when participants were in an aggressive rather than the neutral facial expression. To our knowledge, this provides the first evidence suggesting that aggressive facial expressions can lead people to use their negative and positive thoughts more than a neutral expression. Importantly, the facial expression manipulation did not affect the valence, number, or quality of participants' thoughts. Instead, the aggressive face affected use of those thoughts.

General discussion

Previous research has provided extensive evidence revealing that priming aggression leads to more aggressive thoughts, feelings, and evaluations regarding others (Anderson, 1997; Anderson & Bushman, 2002; Berkowitz & LePage, 1967; Boxer et al., 2009; Calvete & Orue, 2012). Also, as reviewed earlier, aggressive primes not only trigger aggressive thoughts toward others but also toward oneself (e.g. Copeland-Linder et al., 2010; Gorman-Smith & Tolan, 1998; Mendelson et al., 2010; Sigfusdottir et al., 2004; Wilson & Rosenthal, 2003).

In the present research we proposed that aggressive primes need not always lead to more aggressive self-thoughts and more negative self-evaluations. We argued that the effects of priming aggression on self-evaluation depend on the psychological process by which aggression influences evaluations. The present findings confirmed that aggressive primes were capable of affecting reliance on one's thoughts at least under the circumstances present in the current studies, such as when primes were induced following or during (rather than preceding) the generation of self-traits, and thinking was high.

In sum, Experiment 1 showed that the effect of the direction of thoughts (positive/negative) on self-related attitudes was significantly greater when participants wrote their thoughts and this was followed by an aggressive rather than a neutral prime. Consistent with the self-validation hypothesis, the obtained interaction between aggressive prime and valence of traits listed showed that among those listing positive self-attributes, those in the aggressive prime condition tended to report more favorable self-attitudes than did those in the neutral prime condition. However, among participants listing negative self-attributes, those in the aggressive prime condition reported less favorable self-attitudes than did those in the neutral prime condition. Had we only included participants with negative self-thoughts, the data would have appeared to show that aggressive primes led to more negative evaluations, consistent with prior research on aggressive primes (e.g. Bushman, 1995; Cárdbaba, Briñol, Brändle, & Ruiz-SanRomán, 2016). The use of participants with positive self-thoughts showed that this pattern was capable of reversing.

A second experiment replicated these findings using an embodiment induction. Specifically, Experiment 2 revealed that with an aggressive facial expression, participants seemed to rely on their thoughts in forming their self-attitudes more so than did participants performing a neutral facial expression. As a consequence, an aggressive pose (vs. neutral) increased the positivity of self-evaluations when thoughts were positive but tended to increase the negativity of self-evaluations when thoughts were negative.

Taken together, the results of the two studies were consistent with the self-validation interpretation regardless of whether the aggressive experience induction involved cognitive priming (writing about an aggressive response toward somebody else, Experiment 1) or embodiment (raising upper lips, Experiment 2). It is noteworthy that the effects of an aggressive prime worked to influence thought use even though our inductions did not influence emotion or reports of alertness. These null effects, however, should be treated cautiously since it may be that emotions dissipated prior to their assessment or that the emotions were mild enough to avoid self-report. Thus, future research should further explore the precise mechanism by which aggressive primes foster thought use whether it be emotion, arousal, feelings of power or preparedness. It might also be that aggressiveness directly leads to confidence and thought reliance. The lack of understanding of the precise mechanism behind the obtained results constitutes a clear limitation of the present research. Thus, our findings should be further replicated using larger samples and a more complete set of potential mediation measures. Understanding the precise path involved could help to determine when and for whom these effects are especially likely to occur.

As explained further below, another potential avenue for further research in this domain might include the examination of the similarities and differences among various types of aggressive prime inductions such as those used in the current research. First, although the results of Experiment 1 suggested that aggressive physical actions are not essential for obtaining the thought use effect, one can still wonder whether those effects would be stronger when the two inductions are combined (i.e. making an aggressive pose while thinking aggressive thoughts). Nonetheless, it seems likely that simply imaging a behavior can sometimes produce effects without physically performing that behavior. For example, it might not be necessary to physically act for some behaviors to produce an effect, but just to believe that the behavior occurred, as in the case of false feedback about behavior (Taylor, 1975; Valins, 1966), and visual illusions (Neumann & Strack, 2000), where participants have the sense that they are moving rather than actually doing so. As noted, the results of our first study are consistent with this view since participants recalled past behaviors related to aggressive responses toward somebody else without physically acting (see also Berkowitz & LePage, 1967).

Another important matter for future research is the exploration of whether facial expressions and memories can be used deliberately in producing changes in one's own psychological processes. Indeed, people use their non-verbal behavior quite deliberately to influence other people. For example, people often use their power positions strategically in influencing and negotiating with others, and people can threaten others in order to avoid engaging in physical fights (e.g. Pellis & Pellis, 1996). However, it is not clear whether people can also use their hostile or aggressive behaviors deliberately to influence themselves. According to past research, people deliberately choose to engage in negative emotions such as anger when they think that those emotions can help them to achieve a desired goal (e.g. fighting; Tamir & Ford, 2012). In contrast, other

research suggests that the effects of most bodily responses (and other incidental inductions, including the retrieval of past memories) are likely to be eliminated when people become aware of their incidental nature (Chandler, Reinhard, & Schwarz, 2012; Schwarz & Clore, 1983). Thus, future research should examine the question of whether, when, and how awareness of the effects of incidental experiences of hostility or aggression can decrease and increase their impact.

Finally, it is important to note that for aggressive behaviors and memories to enhance reliance on the contents of one's mind, it presumably requires the aggressiveness to be perceived as a confidence cue. If aggressive experience is associated with feelings of insecurity or weaknesses, then it might reduce the impact of thoughts relative to control. Future research should examine the extent to which people and contexts can vary in their attitudes and meanings associated with aggressiveness (e.g. Anderson, Benjamin, Wood, & Bonacci, 2006; Buss & Perry, 1992). For example, consistent with previous work on embodiment showing that making a fist was only associated with power and strength for men but not for women (e.g. Schubert, 2004), we argue that if the meaning associated with the aggressive inductions changes, the effect of those inductions on subsequent attitudes would also change (Briñol, Petty, & Tormala, 2006).

In addition, research on individual differences in aggression has shown that people who score high in trait aggressiveness have more positive attitudes toward violence, and are more likely to have aggressive feelings, thoughts, and behaviors compare to those low in trait aggressiveness (Brändle, Cárdbaba, & Rivera, 2015; Bushman, 1995; Bushman & Wells, 1998). For those individuals high in trait aggressiveness, aggressive inductions like the ones used in these studies can potentially create a fit making them feel more pleasant. If state aggressiveness matches with trait aggressiveness, individuals might rely on their thoughts because they like them and they feel good rather than because they feel confident about their validity, a form of validation called affective self-validation (see Bless et al., 1996; Briñol et al., 2007; Clore & Huntsinger, 2007; Huntsinger, 2013; Huntsinger, Clore, & Bar-Anan, 2010; Petty & Briñol, 2015, for a review of affective validation).

In conclusion, the findings of the current research provide an important extension to prior work on self-validation processes and the impact of aggressive experience on judgment. Specifically, the present studies extend this line of research by demonstrating that aggressive experiences not only can provoke aggressive thoughts when the experiences precede thinking as shown in much prior research, but aggressive experiences can also increase the reliance on one's thoughts rendering self-judgments either more positive or more negative depending on the valence of one's thoughts. This meta-cognitive effect is most likely when the aggressive experiences accompany or follow thought generation.

Note

1. That is, the sample size for this study was determined by aiming to obtain an *N* per cell that met or exceeded the prevailing norms for this type of research in self-validation (e.g. Briñol & Petty, 2003; Briñol, et al., 2009) rather than a formal power analysis. However, a post hoc power analysis indicated that the sample obtained had a power of .79 to detect the effect size for the two-way interaction observed.

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The authors declare that they have no conflicts of interest concerning this article, and all of them agree with the submission.

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