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Explicit and Implicit Approach Motivation Interact to Predict Interpersonal Arrogance

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Abstract

Self-reports of approach motivation are unlikely to be sufficient in understanding the extent to which the individual reacts to appetitive cues in an approach-related manner. A novel implicit probe of approach tendencies was thus developed, one that assessed the extent to which positive affective (versus neutral) stimuli primed larger size estimates, as larger perceptual sizes co-occur with locomotion toward objects in the environment. In two studies (total $N = 150$), self-reports of approach motivation interacted with this implicit probe of approach motivation to predict individual differences in arrogance, a broad interpersonal dimension previously linked to narcissism, antisocial personality tendencies, and aggression. The results of the two studies were highly parallel in that self-reported levels of approach motivation predicted interpersonal arrogance in the particular context of high, but not low, levels of implicit approach motivation. Implications for understanding approach motivation, implicit probes of it, and problematic approach-related outcomes are discussed.

Keywords

Approach Motivation; Implicit; Incentive Salience; Interpersonal Arrogance

There are tradeoffs to high levels of approach motivation. On the one hand, high levels of approach motivation are thought to underlie positive emotional states such as excitement (Watson, Wiese, Vaidya, & Tellegen, 1999). High levels of approach motivation should also invigorate goal-pursuit (Higgins, 1997) and potentially facilitate progress as a result (Carver & Scheier, 1998). On the other hand, Gray (1982) suggested that high levels of approach motivation predispose one to a certain class of dysregulated outcomes. Increasingly so, and consistent with the latter perspective, higher levels of approach motivation have been linked to addictive behaviors (Franken, Muris, & Georgieva, 2006), anger and aggression (Carver & Harmon-Jones, 2009), and bipolar symptoms (Alloy et al., 2006).

Nonetheless, high levels of self-reported approach motivation, considered alone, may often not predict its problematic manifestations. For example, higher levels of self-control should mitigate the extent to which approach motivation results in addiction (Baumeister, Heatherton, & Tice, 1994). Similarly, better neurological functioning should mitigate the extent to which approach motivation predicts bipolar symptoms (Alloy et al., 2009). Finally, higher levels of BIS (the Behavioral Inhibition System: Gray, 1982) are thought to mitigate the pernicious outcomes predicted by higher levels of BAS (the Behavioral Activation System: Gray, 1982), the latter more or less synonymous with trait approach motivation (Wallace & Newman, 2008). In these cases, the relevant moderators (e.g., self-control) are

inhibitory – i.e., they render it *less* likely that individual differences in BAS will result in BAS-related dysregulated outcomes.

In addition to moderators of an inhibitory type, there are likely moderators of an activating type as well. *Activating* factors, as conceptualized, are those that render it *more* likely that self-reports of BAS motivation will predict BAS-related outcomes. Such activating factors have by-and-large not been investigated, but were systematically investigated here. Self-reported levels of BAS may be essentially beliefs about the self's level of approach motivation (Robinson & Clore, 2002). Such beliefs may be consequential or inert in nature. Such beliefs are likely to be consequential in nature to the extent that the individual can be characterized as approach-related in implicit, dynamic terms (Pervin, 1994). By contrast, such beliefs may be inert in nature to the extent that the individual exhibits no tendency toward implicit approach motivation, defined in terms of online reactivity to appetitive events as they occur (Gray, 1982). In other words, we view high levels of implicit approach as an activating influence on BAS-outcome relations.

These ideas are admittedly novel and it is therefore of utility to consider an empirical precedent. The trait of neuroticism is predictive of quite a few problematic outcomes (Lahey, 2009), but in a manner lacking specificity (Widiger, Verheul, & van den Brink, 1999). Accordingly, it is difficult to predict which specific problematic outcomes are likely to occur at high levels of neuroticism. In three studies, Moeller, Robinson, and Bresin (2010) created priming tasks to examine the extent to which stressful thoughts, once activated, facilitated the subsequent categorization of aggressive (Studies 1 & 2) or eating (Study 3) stimuli. Neuroticism interacted with such implicit associations and did so in an activation-related manner. For example, neuroticism predicted aggression particularly so among individuals exhibiting stronger stress-aggression associations in the priming task. Similarly, in the present studies, we predicted that self-reported levels of BAS would predict a BAS-related outcome to a greater extent among individuals displaying higher levels of implicit approach motivation. To investigate these ideas, we needed an implicit assessment of approach motivation and we developed two such measures, albeit on the basis of similar logic.

An Implicit Probe of Approach Motivation

The dopamine system is widely regarded as one mediating the sorts of processes that we sought to model. Triggers of the dopamine system involve unconditioned (Berridge & Robinson, 2003) and conditioned (Knutson & Peterson, 2005) rewards. Activation of this system triggers approach-related behaviors. For example, mice bred to be dopamine-rich exhibit higher levels of approach behavior in relation to environmental rewards (Yin, Zhuang, & Balleine, 2006) and animals bred to lack dopamine synthesis are relatively passive in such contexts (Robinson, Sotak, During, & Palmiter, 2006). Drug studies have provided convergent evidence: Dopamine agonists such as amphetamine facilitate behavioral approach (Wyvell & Berridge, 2000), whereas dopamine antagonists impair the pursuit of rewarding stimuli (Wise, 2004).

Perceptually, the approach system biases behavior in an approach-related direction by boosting the salience of desirable stimuli and paired neutral stimuli (Berridge, 2007). This boost has primarily been found in terms of increased neural responding in dopamine-rich areas of the brain mediating both attention and goal-directed motor activity (Wyvell & Berridge, 2000). Among human beings, such incentive salience effects have been demonstrated among addicts exposed to drug cues (Robinson & Berridge, 2003). Perceived size is a straightforward way of assessing perceptual salience in that salient stimuli should appear larger than they actually are. Indeed, perceived size estimates have been shown to track reward value in several social cognitive studies. For example, Bruner and Goodman

(1947) found that coins were perceived larger in size than equally-sized cardboard disks, Lambert, Solomon, and Watson (1949) found that tokens paired with rewards were overestimated in size, and Velkamp, Aarts, and Custers (2008) found that thirsty participants overestimated the amount of water in a glass. Similar phenomena were reported by Alter and Balcetis (2011).

Individuals differ in self-reported levels of approach motivation and they should differ in implicit probes of approach motivation as well (e.g., Robinson, Meier, Tamir, Wilkowski, & Ode, 2009). We thus expected meaningful individual differences in the extent to which positive (relative to neutral) affective primes led to higher subsequent size estimates (see method for paradigm details). Such differences, in turn, were proposed to interact with BAS motivation to predict an outcome of a problematic approach-related type. On the basis of several considerations, we focused on interpersonal arrogance as the outcome.

Interpersonal Arrogance

Interpersonal arrogance is an approach-motivated behavioral strategy to social interactions (Kiesler, 1983). Interpersonal arrogance is also problematic in that it provokes hostility in others, undermines social support, is associated with poorer relationships, and poorer health functioning (Smith, Glazer, Ruiz, & Gallo, 2004). From a personality-social standpoint, then, this outcome is particularly worth explaining. There are further considerations in favor of this outcome variable. Personality and clinical psychologists have developed a number of scales designed to assess self-centered, dominant social interaction strategies and behaviors, including those assessing Machiavellianism (Christie & Geis, 1970), psychopathy (Levenson, Kiehl, & Fitzpatrick, 1995), and narcissism (Raskin & Hall, 1981). Such scales are positively intercorrelated (Paulhus & Williams, 2002) and marked by common features: unregulated, dominant, and aggressive social functioning (Jakobwitz & Egan, 2006).

The common basis of such pernicious interpersonal tendencies can be best appreciated from the perspective of the interpersonal circumplex (Wiggins, 1979). In this circumplex model, exploitative, approach-oriented behaviors are captured by the arrogance dimension, which contrasts dominant/cold (arrogant) with submissive/warm (unassuming) individuals. In an impressive integration effort of this type, Wiggins and Broughton (1991) located 172 personality traits within this interpersonal space. Personality scales designed to measure narcissism, antisocial personality, aggression, and impulsivity were located in the arrogant location of the circumplex, whereas personality scales designed to measure deference, dependent personality, and abasement were located in the unassuming location of the circumplex (also see Wiggins & Trapnell, 1996). Thus, our interactive predictions should have implications for other approach-related tendencies of this type such as anger-motivated aggression.

Overview of Studies

Two studies were conducted. For the sake of convergent validity, BAS motivation and interpersonal arrogance were assessed in both studies. In both studies as well, we modeled individual differences in implicit approach motivation by assessing the extent to which positive affective primes, relative to neutral affective primes, resulted in larger subsequent size estimates. The implicit approach paradigms were different in the two studies, however, to ensure that the results generalize across different procedures for assessing incentive salience processes. Size estimates were obtained following negative primes to ensure that the interactive findings pertain to positive priming effects rather than affective priming effects generally considered. Finally, primary psychopathy was examined in Study 1 for purposes of discriminant validity and we assessed two additional outcomes in Study 2 – depression and optimism – to further validate our implicit approach motivation measure.

Study 1

Quite a few theories contend that the approach system is primed by positive affective stimuli, particularly those high in arousal or activation (Gray, 1982; Lang, Bradley, & Cuthbert, 1997; Watson et al., 1999). In Study 1, we used emotion slides, which have been carefully normed (Lang, Bradley, & Cuthbert, 2008), to activate the approach motivation system in an implicit paradigm. There is good evidence for the idea that positive slides of this type activate the approach system in that such slides result in higher levels of zygomatic facial muscle activity and reduced affect-modulated startle (Lang, 1995). However, there are considerable individual differences in such relations (Lang, 1994), heterogeneity that we sought to exploit in the present study. We do briefly note that anger inductions also appear to trigger the approach motivation system (Carver & Harmon-Jones, 2009), but this complication to approach-related dynamics was avoided by contrasting reactions to positive versus neutral slides.

Method

Participants—Fifty-three (27 female) students from North Dakota State University received course credit by their participation. Their average age was 19.0 years old and 94% of them were Caucasian in race.

General Procedures—Participants arrived to the laboratory in groups of 6 or less. They were generally informed that the study involved personality and perception. Subsequently, they were seated at their own personal computers. We assessed implicit approach tendencies before assessing individual differences in BAS motivation, primary psychopathy, or interpersonal arrogance.

BAS Motivation—We assessed individual differences in BAS motivation using the scale developed by Carver and White (1994). Individuals were asked to report on the extent to which (1 = very false for me; 4 = very true for me) thirteen BAS-related items (e.g., “I go out of my way to get things I want”) generally characterize the self. The scale has exhibited reliability and validity in many studies (for reviews, see Bijttebier, Beck, Claes, & Vandereycken, 2009; Torrubia, Avila, & Caseras, 2008). In the present study, Cronbach's alpha was .77 ($M = 3.06$; $SD = 0.36$).

Implicit Approach Motivation

Overview: Positive incentives (e.g., food, sexual stimuli) trigger a dopamine-related system responsible for “wanting” and pursuing such desirable objects (Berridge & Robinson, 2003). This system remains activated for a short period of time and is thought to enhance the perceptual salience of subsequently presented stimuli in a manner biasing their perceived attainability (Wyvell & Berridge, 2000). We primed this system by presenting positive, neutral, or negative emotional slides at the beginning of each trial. Participants then performed a task that should be sensitive to perceptual salience processes, namely one requiring them to estimate the size of a box, a task held constant across priming conditions. The implicit approach measure (see below) contrasts size estimations following positive versus neutral primes.

Emotional Primes: Each trial began with an emotional prime. Specifically, 150 pictures were selected from the International Affective Picture System (Lang et al., 2008). Positive pictures (primes) consisted of food objects, sexual activity, babies, and other purported triggers of the approach motivation system (Lang, 1995). Neutral pictures typically involved common household objects (e.g., a basket) or abstract patterns. Negative pictures were those of an aversive nature (e.g., injury, garbage, or threatening objects). On the basis of the (1–9)

valence norms of Lang et al., positive ($M = 7.38$), neutral ($M = 4.96$), and negative ($M = 2.50$) pictures differed substantially in their valence, $F > 4500$. The positive and negative pictures selected, however, were equal in arousal (overall $M = 5.49$), $F < 1$. Emotional primes were randomly assigned to trial number, separately so for each participant.

Perceptual Task: Each emotional prime was followed by the same perceptual task. Participants were to estimate the size of a white-outlined box against a black background. The box was randomly presented in one of five sizes, defined in pixel-based terms (76, 84, 92, 100, or 108), and was centered such that it was 20% downward from the top of the computer screen. Participants were to estimate the size of the box in relation to a comparison set of boxes presented 90% downward from the top of the computer screen. The comparison boxes spanned a larger range of sizes (70, 74, 78, 82, 86, 90, 94, 98, 102, 106, 110, & 114 pixels). They were ordered from smallest to largest or largest to smallest, from left to right, in a counterbalanced fashion. Responses were made by moving an (originally centered) mouse cursor to the comparison box best matching the target box in perceived size and then making a left mouse click. Note that perceptual responses could not be accurate as the sizes of target and comparison boxes necessarily differed in size.

Instructions and Trial Procedures: Participants were informed that we sought to examine their abilities to alternate between two very different tasks. First, they would be shown a picture slide and, during this exposure time, they were to decide how they felt about it. They did not make an evaluation of the prime, other than in their heads. The affective primes were incidental in this respect. Second, they would perform a very different task requiring them to estimate the size of a presented box. At the beginning of each trial, a picture was presented for 6000 ms and it occupied nearly the entire screen, followed by a 300 ms blank screen. Then, the reference boxes were presented toward the bottom of the computer screen for 800 ms. Finally, a box was presented toward the top of the computer screen. Participants were given 5000 ms to determine the size of the presented box by matching it to (what they perceived to be) the same-sized box from the comparison array. There were 75 paired trials, 25 for each valence, with the particular 75 pictures selected at random from among the 150 pictures mentioned above.

Interpersonal Arrogance—Interpersonal arrogance has been conceptualized in circumplex terms as a particular combination of coldness and dominance (Wiggins & Trapnell, 1996). We assessed interpersonal arrogance in such terms. Wiggins, Trapnell, and Phillips (1988) reported especially favorable psychometric and geometric properties for their revised Interpersonal Adjectives Scales (IAS-R). Wiggins, Phillips, and Trapnell (1989) then showed that such scales well-captured the dysfunctions associated with several personality disorders. Narcissistic and antisocial personality disorders, in particular, can be located along the arrogant vector of the interpersonal space.

In particular terms, individuals indicated the extent to which eight high arrogance markers (e.g., cocky, boastful) and eight low arrogance markers (e.g., boastless, undemanding) characterize the self (1 = extremely inaccurate; 6 = extremely accurate). Ratings for the low arrogance markers were reverse-scored, and then averaged with ratings for the high arrogance markers, to assess interpersonal arrogance in dimensional terms. It should be noted that such markers exhibit bipolarity when correcting for measurement error and thus should be scored in dimensional terms (Wiggins et al., 1988). Alpha for arrogance was .86 ($M = 3.47$; $SD = 0.72$).

Primary Psychopathy—Many individual differences scales of a cold-manipulative type covary with levels of interpersonal arrogance (Wiggins & Broughton, 1991). However, different motives likely underlie such individual differences. In Study 1, we contrast two

outcomes – interpersonal arrogance and primary psychopathy. Interpersonal arrogance, we suggest, is primarily a BAS-driven phenomenon. If so, and consistent with our theoretical framework, BAS-arrogance relations should be stronger among individuals displaying higher levels of implicit approach motivation. On the other hand, prominent models of primary psychopathy link it to low BIS motivation rather than high BAS motivation (Patrick, 2007). If so, we should observe no BAS by implicit approach motivation interaction in the prediction of primary psychopathy. Discriminant findings of this type would not only support our theoretical predictions, but also constrain the scope of them to outcomes that are primarily BAS-driven. We assessed primary psychopathy in relation to the relevant scale of Levenson et al. (1995; scores vary from 1 to 4), which has demonstrated utility in the personality disorder realm (Miller, Gaughan, & Pryor, 2008). Alpha for this scale was .88 ($M = 2.00$; $SD = 0.49$).

Results

Quantification of Implicit Approach Motivation—Perceptual responses were first scored by subtracting the actual size of the presented box from the perceived size of the presented box, such that higher scores reflected size overestimations. There was a general trend to overestimate the size of the boxes by about 1 pixel ($M = 0.96$). An ANOVA then examined such size estimation biases as a function of prime type (positive versus neutral versus negative). There was no main effect for Prime Type in this analysis, $F < 1$. This lack of a normative effect likely occurred because individuals were not asked to evaluate the prime stimuli, other than in their heads, resulting in weaker normative effects than should occur when evaluative responses are required (Klauer & Musch, 2003). Such evaluations were required in the Study 2 paradigm and – in this context – we predicted a more robust normative effect. In any case, our focus was on individual differences, which were consequential (see below).

There were three size overestimation scores – one for each of the three priming conditions. Such scores were positively correlated across priming conditions, r s varying from .62 to .86, $ps < .01$. We therefore created two difference scores. The first was especially germane to our hypotheses and quantified the extent to which size overestimations were higher following positive minus neutral affective primes ($M = 0.10$; $SD = 1.89$). For purposes of discriminant validity, we also calculated a second score that quantified the extent to which size overestimations were higher following negative minus neutral affective primes ($M = 0.01$; $SD = 1.65$). There was a marginally significant negative correlation between these scores, $r = -.25$, $p < .10$, indicating affect-specificity in relation to such priming effects. Both individual difference measures were reliable on the basis of a correlation between difference scores pertaining to odd-numbered versus even-numbered trials, r s $> .75$, $ps < .01$.

Predicting Individual Differences in Interpersonal Arrogance—BAS motivation and implicit approach tendencies were not correlated, $r = .13$, $p > .35$. However, we hypothesized that these individual differences would interact in their prediction of interpersonal arrogance. To examine this hypothesis, a multiple regression analysis was performed. Both predictors were centered and we then computed an interaction term (Aiken & West, 1991). In this multiple regression, there was a main effect for BAS, $t = 2.14$, $p < .05$, Beta = .27, but no main effect for Implicit Approach Motivation, $t = -1.47$, $p > .10$, Beta = .19. Of most importance, and as hypothesized, there was a significant BAS by Implicit Approach Motivation interaction, $t = 2.59$, $p < .05$, Beta = .33.

Estimated means (Aiken & West, 1991) for the significant interaction are reported in Figure 1 and they suggest that BAS motivation was a predictor of interpersonal arrogance at high but not low levels of implicit approach motivation. Simple slopes analyses confirmed such

differential associations. Among individuals low ($-1\ SD$) in implicit approach motivation, BAS did not predict interpersonal arrogance, $t = -0.73$, $p > .45$, $Beta = -.15$. Among individuals high ($+1\ SD$) in implicit approach motivation, on the other hand, BAS was a robust positive predictor of arrogance, $t = 3.42$, $p < .01$, $Beta = .69$. Thus, implicit approach tendencies were important in understanding the extent to which individual differences in BAS were consequential in predicting this important social-personality outcome variable.

Recall that we also quantified individual differences in size overestimations following negative (versus neutral) affective primes. As this second implicit measure should not be viewed in terms of implicit approach motivation, we thought it unlikely that it would moderate relations between BAS and interpersonal arrogance. Indeed, no interaction of this type was found in a multiple regression parallel to that reported above, $t = 0.79$, $p > .40$, $Beta = .11$.

Predicting Individual Differences in Primary Psychopathy—The interpersonal arrogance and primary psychopathy outcome measures were moderately correlated with each other, $r = .41$, $p < .01$. On the other hand, our theoretical framework led us to predict an interaction of BAS motivation and implicit approach tendencies only in the case of interpersonal arrogance. Consistent with this framework, there was no interaction of BAS and implicit approach motivation in the prediction of primary psychopathy, $t = -0.30$, $p > .75$, $Beta = -.04$. Further, when controlling for primary psychopathy levels in a multiple regression, BAS motivation and the implicit approach measure continued to interact to predict interpersonal arrogance, $t = 2.97$, $p < .01$, $Beta = .35$. These results are therefore consistent with the idea that implicit approach tendencies activate BAS to predict outcomes of a BAS-related type, but not outcomes of a BIS-related type.

Discussion

Explicit and implicit approach motivation interacted to predict arrogant (dominant, cold, & self-favoring) interpersonal functioning. Further, the interactive findings were consistent with the idea that individual differences in BAS become relevant to predicting interpersonal arrogance only at high levels of implicit approach motivation, consistent with our activation-based hypotheses. Discriminant validity was supported in that BAS and implicit approach motivation did not predict primary psychopathy, an outcome that is less BAS-related in nature (indeed, the correlation between BAS and primary psychopathy was not significant in Study 1: $r = .07$, $p > .60$). We therefore suggest that implicit approach motivation should interact with BAS particularly in the context of BAS-influenced outcomes.

Study 2

The interactive results of Study 1 are clearly novel. Greater confidence in them would occur to the extent that the same interactive pattern can be replicated in a second study. For purposes of a clean conceptual replication, Study 2 again focused on relations between BAS and interpersonal arrogance. On the other hand, we assessed implicit approach motivation in a different (though related) manner in Study 2. Emotional slides are concrete, specific stimuli that can be interpreted in idiosyncratic manners (Larsen, Diener, & Cropanzano, 1987). Affective words are more generic, but also perhaps more consensual in affective connotation for this reason (Osgood, Suci, & Tennenbaum, 1957). In addition, it was of interest whether affective words would be sufficient for activating the implicit approach motivation system, given that strong physiological responses to affective words are unlikely. For such reasons, affective primes in Study 2 were words rather than emotionally-evocative pictures.

We had thought it likely that positive (relative to neutral) slides would result in greater size overestimates in Study 1. This was not the case, though the lack of this normative main effect was not problematic in the context of our individual difference predictions. Regardless, it seemed useful to revise the size estimation dependent task in Study 2. Study 1 had presented boxes that differed in actual size and size estimations were thus highly constrained by this factor. In Study 2, instead, we asked individuals to guess which of two boxes – a smaller or larger one – had been briefly flashed on a particular trial. No boxes had actually been presented and thus the dependent measure was unconstrained by this factor, rendering it potentially more sensitive. Implicit approach motivation was defined in terms of inferring a greater proportion of large boxes on trials involving positive word primes relative to neutral word primes.

Is it meaningful in this assessment context to refer to perceptions? Probably not, but Wyvell and Berridge (2000) provide data consistent with the idea that incentives activate brain regions responsible for approach movements as well as perceptions. When approaching a stimulus, it necessarily becomes larger (Gibson, 1966). Accordingly, results involving the Study 2 assessment of implicit approach motivation might be conceptualized in terms of incipient states of approach-movement rather than perception, but such states are also covered by Berridge's (2007) incentive motivation theory of dopamine functioning. For this reason, identical interactive predictions were made in Study 2 as in Study 1.

Method

Participants and General Procedures—Participants were 97 (52 female) students from North Dakota State University who received course credit. Ninety-six percent were Caucasian in race and the mean age was 19.4. The general procedures were the same as those of Study 1. As in Study 1, implicit approach motivation was assessed before interpersonal arrogance, depression, or optimism.

Implicit Approach Motivation

Overview: We created a second implicit measure of approach motivation also modeled after incentive salience theory (Berridge, 2007). Participants were again told that they would perform two different tasks in an interleaved fashion. The first would require them to evaluate words. The second would be a very different perceptual task.

Affective Primes: We selected 168 words, 56 of each valence, from the ANEW Database (Bradley & Lang, 1999). Positive words represented desirable (to-be-approached) states (e.g., excitement) or objects (e.g., dollar), negative words represented undesirable (to-be-avoided) states (e.g., displeased) or objects (e.g., tomb), and neutral words represented states (e.g., reserved) or objects (e.g., appliance) without strong affective connotations. On the basis of norms (Bradley & Lang, 1999), the positive ($M = 7.27$), neutral ($M = 5.05$), and negative ($M = 2.78$) words differed substantially in their valence, $F > 15000$. The positive and negative words, however, were equal in arousal (overall $M = 5.43$), $F(1, 110) = 1.36$, $p > .20$. Affective primes were randomly assigned to trial number for each participant.

Size-Estimation Task: In Study 1, we presented target stimuli that varied in size. A potentially cleaner way of assessing implicit approach tendencies might instead involve a size-estimation task in the absence of an actually presented object. The processes highlighted by incentive salience theory apply to this context as well (Berridge, 2007).

Participants were told that one of two boxes – either a smaller one or a larger one – would be presented very quickly, so quickly in fact that it might be difficult to discern. Nonetheless, participants were told that their intuitions as to whether the smaller or larger box had been

presented would likely be generally correct. Following a brief visual disruption (see below), two white-outlined boxes were presented in a vertically centered fashion. One was 1 mm in size, whereas the other was 1.5 mm in size. Such boxes were assigned to leftward versus rightward positions at random. Participants were to move their mouse cursor to the box intuited to have been presented on that trial, following which they made a left mouse click. The program recorded whether the smaller or larger box had been selected.

Trial Procedures: The word prime for each trial was presented for 600 ms at center screen, followed by its disappearance for 50 ms, followed by its reappearance for 600 ms. The 50 ms blank period was the one in which the smaller or larger box had been supposedly presented. Then, the word disappeared, two boxes were presented side by side, and participants were to use the mouse to indicate which box had been briefly flashed on that trial. After the box selection was made, and to ensure that words had actually been evaluated, participants were to say “good”, “bad”, or “neutral” into a voicekey microphone to evaluate the trial-specific prime. Voicekeys record sound pressure, not actual responses, and therefore accuracy data were not available for the evaluation task. Regardless, the Bradley and Lang (1999) norms clearly establish the effectiveness of this manipulation. There were 168 trials, one for each affective word prime.

Other Measures—Individual differences in BAS (Carver & White, 1994; $M = 3.22$; $SD = 0.40$; $\alpha = .80$) and interpersonal arrogance (Wiggins et al., 1988; $M = 3.68$; $SD = 0.92$; $\alpha = .92$) were assessed in a manner identical to Study 1. Study 2 also included two outcomes that should – theoretically at least – vary by approach motivation. First, a number of theories of depression view it in terms of deficits in approach motivation (Tomarken & Keener, 1998; Watson, 2000). Depression levels were assessed by Beck's Depression Inventory (Beck, Steer, & Garbin, 1988; scores can vary from 0 to 3), which has good evidence for its reliability and validity ($M = .30$; $SD = .24$; $\alpha = .84$ in the present study). Second, approach-motivated individuals may be more optimistic in their expectations of future outcomes (Carver & Scheier, 1998). We assessed optimism in terms of the LOT-R, a reliable and valid measure of such future-oriented expectations (Scheier & Carver, 1985; $M = 3.49$ along a 1 to 5 scale; $SD = .67$; $\alpha = .76$). Construct validity for the implicit approach measure would be found to the extent that it positively predicts optimism and negatively predicts depression, above and beyond the variance in these outcome measures predicted by BAS motivation.

Results

Quantification of Implicit Approach Motivation—Regardless of the valence of affective primes, participants tended to believe that the larger rather than smaller box had presented on the majority of trials ($M = 58\%$). Above, we suggested that the task used in Study 2 might be more sensitive to implicit approach tendencies than that used in Study 1. Evidence in favor of this idea was found in an ANOVA that examined the proportion of large-box selections as a function of prime type (positive versus neutral versus negative). There was a main effect for Prime Type in this analysis, $F(2, 192) = 5.85$, $p < .01$, such that a higher proportion of large boxes were inferred subsequent to positive affective primes ($M = 61\%$) relative to neutral ($M = 57\%$) and negative ($M = 56\%$) affective primes.

To quantify implicit approach and avoidance motivation, we computed two difference scores. The first was of greater theoretical interest and subtracted the proportion of large size estimates following neutral primes from the proportion of large size estimates following positive primes ($M = 3.6\%$; $SD = 14\%$; split-half reliability = .61). We also calculated a second, parallel score contrasting neutral and negative priming conditions ($M = -1.7\%$; $SD = 13\%$; split-half reliability = .71). These scores were not correlated, $r = -.03$, $p > .75$.

Predicting Individual Differences in Interpersonal Arrogance—As in Study 1, BAS and implicit approach motivation scores were not correlated, $r = .07$, $p > .45$. Regardless, higher levels of implicit approach motivation should result in stronger BAS-arrogance relations. A multiple regression was performed to examine this hypothesis, following the recommended procedures of Aiken and West (1991).

Higher levels of BAS predicted higher levels of interpersonal arrogance, $t = 2.52$, $p < .05$, $Beta = .25$, but there was no main effect for the implicit measure, $t = -.34$, $p > .70$, $Beta = -.04$. Of most importance, the interaction of these two predictors was significant, $t = 2.45$, $p < .05$, $Beta = .26$. Estimated means for this interaction are graphically displayed in Figure 2. At low (-1 *SD*) levels of implicit approach motivation, BAS did not predict interpersonal arrogance, $t = -0.15$, $p > .85$, $Beta = .02$. On the other hand, at high ($+1$ *SD*) levels of implicit approach motivation, BAS was a robust predictor of interpersonal arrogance, $t = 3.40$, $p < .01$, $Beta = .52$. These results are remarkably parallel to those of Study 1. Further, there was no interaction of BAS and the implicit measure contrasting size estimations following negative versus neutral primes, $t = 1.40$, $p > .15$, $Beta = .14$, again parallel to the Study 1 findings.

Additional Outcomes—We hypothesized that implicit approach motivation would positively predict optimism and negatively predict depression. Two multiple regressions were conducted, one for each outcome, in which both BAS and implicit approach motivation were simultaneously regressed. In the first analysis, implicit approach motivation positively predicted optimism, $t = 2.04$, $p < .05$, $Beta = .20$, whereas levels of BAS motivation did not, $t = 0.38$, $p > .65$, $Beta = .04$. In the second analysis, implicit approach motivation negatively predicted depression, $t = -2.04$, $p < .05$, $Beta = -.20$, whereas levels of BAS motivation did not, $t = 0.59$, $p > .55$, $Beta = .06$. Thus, in these analyses at least, the implicit relative to explicit approach motivation measure was a better predictor of outcomes theoretically linked to approach motivation. Such findings support the construct validity of the implicit approach motivation measure. The caveat to this conclusion is that the effect sizes were moderate and should be replicated in relation to other outcomes (e.g., addiction, positive affect) theoretically linked to higher levels of approach motivation.

Discussion

The paradigm used in Study 2 proved to be more sensitive to implicit approach processes in normative terms. We suggest that this was so primarily because the dependent task was altered such that size estimates could not be based on the actual size of presented target objects. Accordingly, priming effects were less constrained by this factor. In any case, the interactive results were exactly parallel to those observed in Study 1. Explicit and implicit approach motivation again interacted, BAS motivation was a non-significant predictor of arrogance levels among individuals low in implicit approach motivation, and BAS motivation was a pronounced such predictor among individuals high in implicit approach motivation. The clean nature of the replicated pattern should be accorded considerable weight.

Study 2 sought to activate the implicit approach motivation system using affective words rather emotion-inducing images. The success of this priming manipulation has several implications. It is apparent that high levels of emotional arousal are not necessary to prime implicit approach tendencies among human beings (also see Chen & Bargh, 1999). This is likely so because the incentives for approach behavior among human beings are often symbolic in nature, as is true of affective words (Lang et al., 1997; Osgood et al., 1957). Accordingly, we suggest that theories of approach motivation, which are typically discussed

in the context of unconditioned rewards like food or sexual opportunities, can be effectively modeled among human beings in relation to far less visceral incentives.

General Discussion

We developed an implicit measure seeking to capture the extent to which positive affective stimuli prime the approach motivation system. To the extent that they do so, subsequently presented objects should appear more salient (Berridge, 2007) or larger (Bruner, 1951). In two studies, we were able to replicate the same pattern in which self-reported and implicit measures of approach motivation interacted to predict levels of interpersonal arrogance. The interactions were highly parallel and provided support for the idea that implicit approach motivation, as assessed, activates BAS-related tendencies toward interpersonal arrogance. In the General Discussion, we consider what has been learned on the basis of these findings, address several questions, and present directions for future research as well.

In Study 2, it was found that positive affective primes generally resulted in higher subsequent size estimates than did neutral affective primes. In Study 1, no such normative pattern was found. The lack of normative effects in Study 1 was likely due to the absence of an evaluation task and the fact that actual target stimuli were presented. Accordingly, we view the implicit motivation measure of Study 2 as a better one. In this context, we were able to provide novel behavioral evidence for Berridge's (2007) suggestion that positive stimuli prime the approach system and subsequent size estimates in an approach-related direction.

Approach and avoidance motivation systems are thought to be relatively independent (Gray, 1982). Consistent with this point, self-report measures of approach and avoidance motivation have been shown to be relatively orthogonal in structural equation modeling studies (Elliot & Thrash, 2002). Whether independence characterizes implicit approach and avoidance motivation, however, had been largely unknown. Our results are informative in that both studies found that the extent to which positive primes resulted in higher size estimates was independent of the extent to which negative primes resulted in higher size estimates, both relative to a neutral control condition. The substantive results reported thus reflected priming effects specific to appetitive stimuli.

Explicit and implicit probes of motivation should not be equated with each other or assumed to correlate. Along these lines, McClelland, Koestner, and Weinberger (1989) reviewed a considerable body of research showing that self-reported and TAT-based measures of achievement, power, and affiliation motivation are quite independent, at least typically so (Thrash, Elliot, & Schultheiss, 2007). Although no comparable analysis of approach motivation has been conducted, there are reasons for thinking that explicit and implicit variants of it are likely to reflect different processes. Explicit measures of approach motivation are surely influenced by some factors that are particular to self-report such as social desirability (Edwards, 1957), generalized beliefs about the self (Robinson & Clore, 2002), and the substantial difficulties involved in translating essentially non-verbal motivational processes into verbal terms (Schultheiss, 2008). Implicit measures of approach motivation, on the other hand, are more likely to tap micro-momentary responses to appetitive stimuli and reactivity in relation to them (Winkielman, Knutson, Paulus, & Trujillo, 2007). Consistent with such considerations, neither of the present studies found a significant correlation between the explicit and implicit approach motivation measures.

We hasten to add that explicit measures of approach motivation have considerable advantages relative to implicit measures of approach motivation. A large literature has shown that individual differences in BAS are consequential in many outcome realms (Bijttebier et al., 2009; Torrubia et al., 2008). By contrast, implicit measures of approach

motivation have lesser evidence for their predictive validity (though see Robinson et al., 2009). Of even more importance to our studies, we found that implicit assessments of approach motivation, based on incentive salience considerations (Berridge, 2007), did not predict interpersonal arrogance in zero-order terms. Quite the contrary, it was found that explicit and implicit assessments of approach motivation interacted. Self-reports of BAS motivation were thus critical to understanding the findings. The present results are novel, but they comport with a recent body of work showing that self-reported traits and implicit processing tendencies typically interact (Robinson, 2004; Robinson & Sedikides, 2009), particularly to the extent that motivation-related outcomes are involved (e.g., Meier & Robinson, 2004; Tamir, Robinson, & Solberg, 2006).

Additional Questions, Considerations, and Future Directions

The implicit approach measure developed is consistent with a broad class of theories suggesting that approach motivation is triggered by appetitive cues in the environment, which in turn biases cognitive mechanisms in an approach-related direction (Gray, 1982; Lang, 1995; Miller, 1944). We regard incentive salience theory (Berridge, 2007) as a particularly useful way of conceptualizing such biasing effects. As to whether size estimates are the best way of modeling such prime-driven effects, we suggest that they are because the most prominent perceptual effects of approaching stimuli involve their enlargement in the perceptual field (Gibson, 1966). Nonetheless, it would be useful to examine other perceptual dependent measures consistent with salience such as perceived clarity, perceived temporal duration, or perceived figure-ground contrast. In any case, the present probe should be viewed in terms of an early effect of appetitive cues, one that is central in origin and presumably precedes locomotion in a forward-moving direction. It may be possible to develop other implicit approach measures in which movement times are the focus of interest, but what defines an approach movement has turned out to be somewhat complicated in such paradigms (Markman & Brendl, 2005; Proctor & Zhang, 2010).

Neither study found that implicit avoidance tendencies, modeled in terms of size estimates, interacted with BAS to predict interpersonal arrogance. We suggest that such non-results support the discriminant validity of our findings, particularly in ruling out individual differences in affect-enhancement effects of a general type. On the other hand, perceptual size estimates may be quite ambiguous as reflections of an avoidance-motivated system. In the revised Reinforcement Sensitivity Theory (Corr, 2010), for example, the system responsible for preserving safety in the context of threats is termed the Fight-Flight-Freeze System (FFFS). That there is a single such system is supported by animal models, which emphasize outputs of the amygdala (Fanselow, 1994; Gray & McNaughton, 2000). As fighting implies forward movement and fleeing implies backward movement, however, the same system may result in different perceptual size estimates depending on the individual's preferred behavioral strategies for dealing with threat. The implicit avoidance measure developed, then, may be of most utility as an implicit probe of individual differences in *defensive direction* (Blanchard & Blanchard, 1990).

Wiggins and Broughton (1991) showed that interpersonal arrogance, as assessed, correlates positively with scales of narcissism, antisocial personality, aggression, and impulsivity, while correlating negatively with scales assessing various forms of inhibited social behavior. This work is of major importance in integrating diverse assessments into a common interpersonal framework (also see Wiggins, 1979; Wiggins et al., 1988). Such considerations suggest, but by no means conclusively demonstrate, that the interactive pattern of our findings would occur in relation to these more particular personality dimensions. Indeed, approach-related theories of narcissism (Foster & Trimm, 2008) and aggression (Carver & Harmon-Jones, 2009) have gained considerable traction in recent years. At the same time, our results indicate that assessments of implicit approach motivation are likely to advance

the field. In this connection, recall that Gray (1982) theoretically linked individual differences in BAS to impulsivity. Psychometric analyses involving self-report scales do not support this theoretical link (Zelenski & Larsen, 1999). On the other hand, our findings suggest that BAS and impulsivity are likely to be more systematically related to each other to the extent that the individual also exhibits high levels of implicit approach motivation. In this connection, though, we follow Cyders and Smith (2008) in thinking that BAS and implicit approach motivation are most likely to predict an appetitive form of impulsivity termed “positive urgency” – i.e., tendencies toward impulsivity in the context of positive incentives or emotional states.

Researchers have recently linked BAS motivation to a number of outcomes of an “unmitigated” approach type. At the same time, and as has occurred in other literatures (e.g., Corr, 2010), such relations appear to be moderated by a number of factors. In the present studies, we were able to show that BAS was a consequential predictor of interpersonal arrogance particularly in the context of high levels of implicit approach motivation. In future research, it would seem quite valuable to extend this interactive analysis to other outcomes purported to reflect an unmitigated approach strategy to life such as addictive behaviors (Franken et al., 2006), exploitative relationship tactics (Buss, 1992), quarrelsome and aggressive behaviors in daily life (Moskowitz, 2010), and bipolar symptoms (Alloy et al., 2006).

It must be acknowledged that the outcome variable examined – interpersonal arrogance – was a self-reported one. Actual behaviors might be profitably assessed in future studies. For example, BAS and implicit approach motivation should interact to predict aggressive responses to laboratory provocation (Carver & Harmon-Jones, 2009), should interact to predict behaviors such as eye contact in laboratory interaction protocols (Gifford, 1994), and should interact to predict impolite behaviors in naturalistic settings (Forgas, 1999). Further, as informant-reported outcomes are more behaviorally-based than self-reports are (Vazire, 2006), we would expect similar interactions in predicting the extent to which informants view the individual as arrogant or aggressive. Finally, as arrogant interpersonal functioning is toxic to social relationships (Smith et al., 2004), BAS and implicit approach motivation should predict personal relationships that shorter-lived and more conflicted in nature.

The present probe of implicit approach sought to assess quite general reactions to positive or appetitive affective stimuli. Given the predictive value of this probe of implicit approach motivation, we can advocate modifications of it. For example, replacing broadly positive stimulus primes with alcohol cues should have value in predicting a motivational impetus toward heavy drinking (Wiers & Stacy, 2006). Similarly, food cues (versus a control condition) might have value in predicting approach-motivated tendencies toward binge eating (Svaldi, Tuschien-Caffier, Peyk, & Blechert, 2010), smoking cues might have value in predicting approach-motivated tendencies toward cigarette smoking (Tiffany, 1990), and sexual cues might have value in predicting promiscuity and unprotected sex (Cooper, Agocha, & Sheldon, 2000). In all such behavioral realms, we suggest, implicit probes of the present type may have value.

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Figure 1. Interpersonal Arrogance as a Function of Explicit and Implicit Approach Motivation, Study 1

Figure 2. Interpersonal Arrogance as a Function of Explicit and Implicit Approach Motivation, Study 2