Implicit self and affect regulation: Effects of sublimal self-activation and action orientation in an affective priming task

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Implicit Self and Affect Regulation: Effects of Action Orientation and Subliminal Self Priming in an Affective Priming Task

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Two studies examined the impact of subliminal self-activation on affect regulation among action- versus state-oriented individuals. Action orientation is a regulatory mode characterized by decisiveness and initiative, whereas state orientation is a regulatory mode characterized by indecisiveness and hesitation. According to the model of intuitive affect regulation (Koole & Kuhl, in press), action-oriented individuals have stronger associations between the implicit self and affect regulation systems than state-oriented individuals. This prediction was tested in an affective priming task (Fazio, Sanbonmatsu, Powell, & Kardes, 1986). As expected, subliminal self primes triggered down-regulation of negative affect among action-oriented participants. By contrast, subliminal self primes triggered persistence of negative affect among state-oriented participants. Supraliminal self primes had no parallel effects. The implicit self may thus play a key role in affect regulation and volitional action control.

The self plays a vital role in people's emotional lives. Such common emotions as guilt, shame, and nostalgia only arise in relation to the self (Sedikides, Wildschut, & Baden, 2004; Tangney & Dearing, 2002). Likewise, people's sense of self-esteem shapes their emotional reactions to success and failure (Brown & Dutton, 1995). Finally, affirming the self protects people against negative ruminations and stress (Cresswell et al., 2005; Koole, Smeets, van Knippenberg, & Dijksterhuis, 1999), whereas focusing on the self's shortcomings renders people vulnerable to anxiety and depression (Higgins, 1987; Pyszczynski & Greenberg, 1987).

To date, research on the interface between self and emotion has relied almost exclusively on conscious, explicit measures. Recent work, however, suggests that self and emotion are to a large extent mediated by unconscious, implicit processes (Conner & Barrett, 2005; Greenwald & Banaji, 1995; Hetts, Sakuma, & Pelham, 1999; Spencer, Jordan, Logel, & Zanna, 2005; Koole & DeHart, in press; Tesser & Martin, 1996; Zajonc, 1998). The question thus arises whether self and emotion also

interface on implicit levels. In the present research, we provide some initial answers to this question. More specifically, we suggest that the implicit self has important affect regulation functions. Efficient affect regulation supports volitional action control (Koole & Kuhl, in press). It therefore stands to reason that the affect regulation functions of the implicit self may be more developed among action-oriented individuals, who are characterized by decisiveness and initiative, than among state-oriented individuals, who are characterized by indecisiveness and hesitation. In the following, we explain the theoretical rationale for linking the implicit self to affect regulation among action- versus state-oriented individuals. Furthermore, we present two empirical studies that tested our theoretical analysis.

Implicit Self: Research Findings and Models

Consciousness has traditionally been considered a core characteristic of selfhood (Baumeister, 1998; Kihlstrom & Klein, 1994). Nevertheless, there is growing evidence for the importance of implicit processes within the self. The earliest and most extensive evidence relates to implicit positivity towards self (Koole & DeHart, in press; Pelham, Carvallo, & Jones, 2005; Spencer et al., 2005). As it turns out, people evaluate self-associated stimuli more positively than self-dissociated stimuli, even when people are unaware of any association between the self and the stimuli at hand. This tendency towards "implicit self-esteem" (Greenwald & Banaji, 1995) is pervasive across many different domains and even influences major life decisions (Pelham et al., 2005).

The implicit self includes not just global evaluations of the self (i.e., implicit self-esteem), but also contains more differentiated self-knowledge. For instance, implicit self-evaluations in one motive domain (e.g., autonomy) do not necessarily transfer to implicit self-evaluations in other motive domains (e.g., relatedness or competence; Koole, 2004). Likewise, subliminal presentation of other persons can instigate social comparison processes on both evaluative (good – bad) and descriptive (e.g., intelligent – stupid) dimensions (Stapel & Blanton, 2005). Finally, representations of collective identities (such as gender or sports-team membership) can vary independently of implicit representations of individual identity (Hetts et al., 1999; Rudman & Goodwin, 2004; Sherman & Kim, 2005).

In view of the broad range of implicit self phenomena, it seems quite challenging to explain which cognitive representations might underlie the implicit self. The most popular type of current theoretical models hold that the implicit self is based on associations (Dijksterhuis, 2004; Gawronski, Bodenhausen, & Becker, in press; Greenwald et al., 2002). According to associative models, implicit self processes are based on automatic associations between self-representations and other representations. These automatic associations are formed by frequently pairing the self with other representations (Dijksterhuis, 2004). Once established, automatic associations can be activated by relevant cues (which trigger the relevant associations). Associative processes are generally assumed to be primitive (i.e., computationally simple) and relatively insensitive to attempts at strategic control. Associative models thus imply that the implicit self will support mainly relatively rigid forms of action control, such as habitual behavior.

Although associations are likely to be important in the implicit self, the implicit self may involve more than merely associations. For instance, some studies have found that subliminal self primes can lead people to break with habitual patterns of thought (i.e., social stereotyping; Macrae, Bodenhausen, & Milne, 1998). Other work

has found that implicit self-representations vary as a function of self-defense motives. When the self is threatened, for instance, individuals with high self-esteem (Jones, Pelham, Mirenberg, & Hetts, 2002) and action-oriented individuals (Koole, 2004) display increases in implicit self-esteem relative to no-threat conditions. Similar defensive increases in implicit self-esteem are not observed among individuals with low self-esteem or low action orientation. Finally, recent studies have found that measured or manipulated implicit self-esteem predicts lowered negative affect (Conner & Barrett, 2005; Dijksterhuis, 2004), suggesting that the implicit self plays in important role in affect regulation. In sum, there is converging evidence that the implicit self is involved in strategic forms of self-regulation. This link between the implicit self and self-regulation would not be a priori predicted by associative models.

The Implicit Self and Intuitive Affect Regulation

The involvement of the implicit self in strategic self-regulation suggests that the implicit self may be mediated—at least in part—by more complex cognitive processes. In line with this, *personality systems interactions (PSI) theory* has proposed that complex cognitive integration processes play an important role in the implicit self (Kuhl, 2000; Kuhl & Koole, 2004). According to PSI theory, the implicit self is grounded in parallel-distributed processing that integrates inputs from many different subsystems. Parallel-distributed processing can handle vast amounts of complex information at much higher speeds than serial processing (Rumelhart, McClelland, & the PDP Research Group, 1986). Implicit self-representations therefore have the computational capacity to integrate the totality of the person's needs, motives, and autobiographical experiences in flexible and context-sensitive ways.

From the perspective of PSI theory, the implicit self is—at least in principle—ideally suited for supporting affect regulation. First, the implicit self is capable of fast and efficient information processing (much faster than the conscious processing). This is most convenient, because people's affective reactions often unfold very rapidly (Berridge & Winkielman, 2003; Zajonc, 1998). Second, the implicit self has access to the totality of the person's goals, motives, and needs that are relevant to the given situation. The implicit self can thus regulate the person's affective states in a manner that is sensitive to the person's broader goals, motives, needs, and contextual demands. Affect regulation that is controlled by the implicit self is flexible, due to the large processing capacity of the implicit self, and efficient, due to the rapid processing abilities of the implicit self. We refer to affect regulation that is controlled by the implicit self as *intuitive affect regulation* (Koole & Jostmann, 2004; Koole & Kuhl, in press).

Intuitive affect regulation is a complex process. Consequently, people have to learn how to use the implicit self to engage in intuitive affect regulation (Koole & Kuhl, in press; Kuhl, 2000). A schematic model of this learning process is displayed in Figure 1. Intuitive affect regulation skills are assumed to depend on associations between the implicit self and emotion systems. When the implicit self has formed strong associations with emotion systems (see the left half of Figure 1), the implicit self will be better able to control the person's affective states. When the implicit self has formed weak associations with emotion systems (see the right half of Figure 1), the implicit self will be less able to control the person's affective states. The skill model further assumes that the formation of associations between the implicit self and emotion systems depends on the social environment (Kuhl, 2000). When the
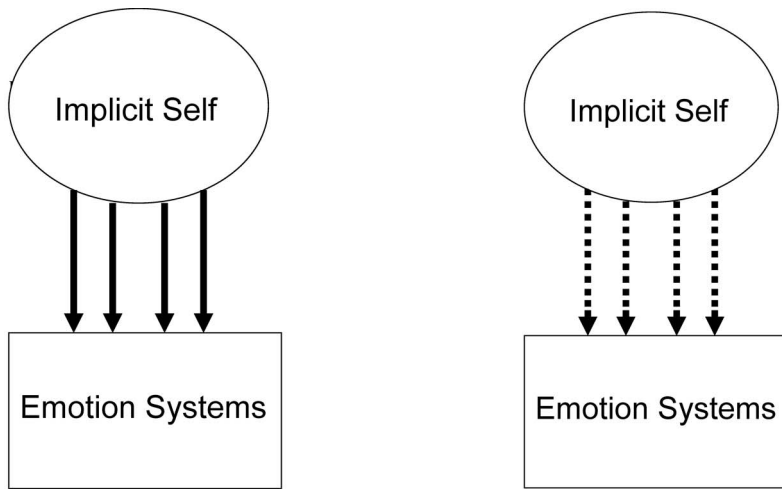
(A) Strong intuitive affect regulation skills   (B) Weak intuitive affect regulation skills

FIGURE 1   Model of intuitive affect regulation.

social environment supports the person's autonomy in dealing with aversive situations, the implicit self will be able to develop strong connections with the affect systems. By contrast, when the social environment is hostile, indifferent, or controlling, the implicit self becomes inhibited and thereby less able to connect with emotion systems.

Although intuitive affect regulation skills are by definition inaccessible to introspection, people may observe the consequences of these skills (or lack thereof) in their behavior. Individuals with strong intuitive affect regulation skills will be able to maintain positive affect even in the face of obstacles and frustrations. Strong intuitive affect regulation skills thus allow individuals to pursue their goals in an unhesitating manner, even under stressful circumstances. Consequently, strong intuitive affect regulation skills may go hand in hand with action orientation. Action orientation is a *meta-static* (change-promoting) regulatory mode that is characterized by decisiveness and initiative (Kuhl, 1984, 1994). By contrast, individuals with weak intuitive affect regulation skills will be vulnerable to intrusions by aversive affective states, especially under stressful circumstances. Weak intuitive affect regulation skills should therefore be associated with state orientation. State orientation is a *cata-static* (change-preventing) regulatory mode that is characterized by indecisiveness and hesitation.

Kuhl (1981, 1994) developed a scale for assessing individual differences in action versus state orientation. Research on action versus state orientation fits well with the model of intuitive affect regulation. First, autonomy-supportive parenting styles are associated with enhanced action orientation in children (see Koole, Kuhl, Jostmann, & Finkenauer, 2006, for a review). The developmental precursors of action orientation thus correspond with the conditions that theoretically should foster intuitive affect regulation skills. Second, action-oriented individuals are more efficient affect regulators than state-oriented individuals, as evidenced in self-reports (e.g., Baumann, Kaschel, & Kuhl, 2005; Brunstein & Olbrich, 1985), physiological functioning (Heckhausen & Strang, 1988), and implicit measures (Jostmann, Koole,

van der Wulp, & Fockenberg, 2005; Koole & Fockenberg, 2006; Koole & Jostmann, 2004). Finally, there is initial evidence that action-oriented individuals use the implicit self to regulate affect (Koole & Jostmann, 2004). Among action-oriented individuals, increases in affect regulation (i.e., faster recognitions of happy faces among angry crowds) were found to be mediated by increases in self-activation (as measured by a response-latency task). State-oriented individuals showed no such mediation. The latter findings bolster the notion that the affect regulation functions of the implicit self are especially developed among action-oriented individuals.
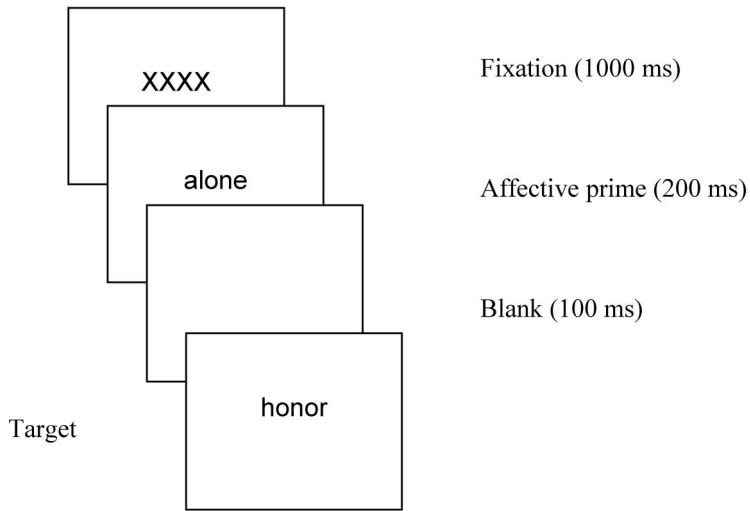
The Present Research and Hypotheses

In the present research, we further addressed the role of the implicit self in affect regulation among action- versus state-oriented individuals. Previous research on this topic was correlational and measured the implicit self in a self-evaluation task that called participants' attention to the self (Koole & Jostmann, 2004). The present research extended this work by examining the causal impact of the implicit self on affect regulation. Moreover, the present research used a subliminal procedure to activate the implicit self, thereby ruling out any influence of conscious self-reflection.

To activate the implicit self, we used a subliminal priming technique (e.g., Macrae et al., 1998). If the implicit self is indeed strongly associated with affect systems among action-oriented individuals, then priming the implicit self should trigger intuitive affect regulation among action-oriented individuals. Because state-oriented individuals are assumed to have weak associations between the implicit self and affect systems, priming the implicit self should not trigger intuitive affect regulation among state-oriented individuals.
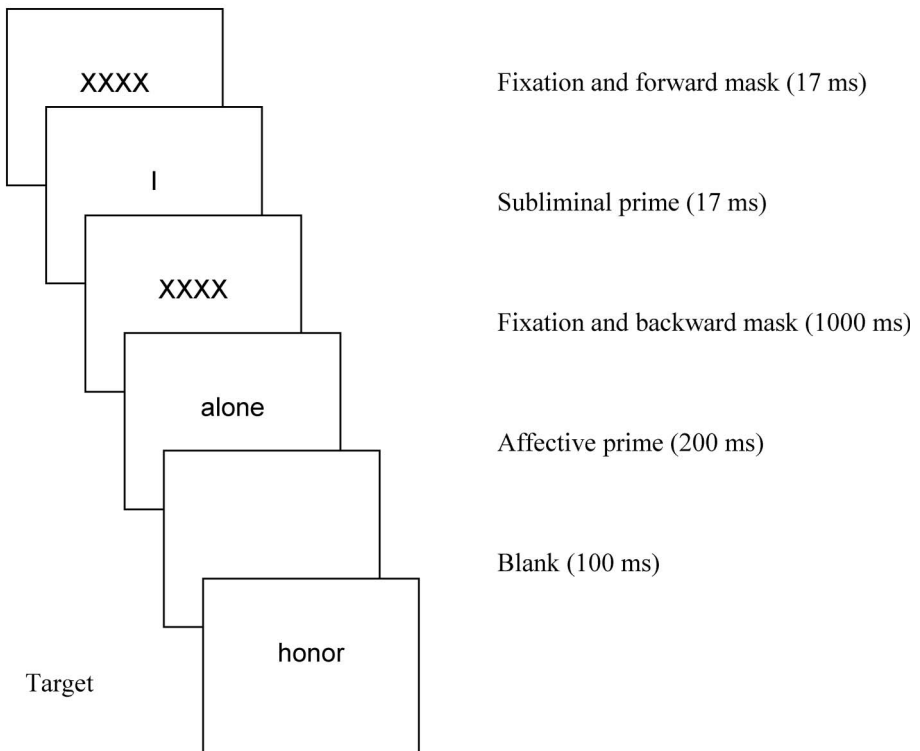
To measure affect regulation, we used an affective priming task (Fazio et al., 1986), a widely researched paradigm that measures rapid affective processing (see Fazio, 2001; Klauer & Musch, 2003, for reviews). In the affective priming task, participants are presented with a number of positively and negatively valenced words (e.g., *hate*, *love*) and are asked to classify these target words as positive or negative as quickly as possible. Briefly before each target word (usually around 300 ms), a positive or negative prime word is flashed. Although the affective priming task has traditionally been used to measure automatic activation of affective responses, the task can also be used to investigate intuitive affect-regulation processes. In particular, past research has shown that intuitive affect regulation promotes faster evaluations of positive targets and slower evaluations of negative targets (Koole & Fockenberg, 2006). Evaluation latencies following negative affective primes therefore served as our index of intuitive affect regulation in the present research.

The implicit self primes were embedded in the affective priming task. As can be seen in Figure 2A, we set the time between the affective prime and target presentation at 300 ms, a stimulus onset asynchrony (SOA) that is commonly used to investigate automatic affective priming (e.g., Fazio et al., 1986). Moreover, intuitive affect regulation processes are most effective in the affective priming task with an SOA of around 300 ms (Koole & Fockenberg, 2006). As can be seen in Figure 2B, we added two brief stimulus presentations before the presentation of the fixation point. The first stimulus was presented as a forward mask, whereas the second stimulus contained the self prime manipulation. Pilot tests had shown that this intermediate prime was not consciously perceptible. The contents of the subliminal primes were experimentally varied, such that they were either or not self-related.

(A) Standard affective priming task

XXXX — Fixation (1000 ms)

alone — Affective prime (200 ms)

Blank (100 ms)

Target — honor

(B) Modified affective priming task

XXXX — Fixation and forward mask (17 ms)

I — Subliminal prime (17 ms)

XXXX — Fixation and backward mask (1000 ms)

alone — Affective prime (200 ms)

Blank (100 ms)

Target — honor

FIGURE 2 Standard (A) and modified (B) versions of the affective priming task.

We assumed that subliminally priming self-related words would activate the implicit self. Among action-oriented participants, the subliminal self primes were therefore expected to trigger intuitive affect regulation, as indicated by faster evaluations of positive targets and slower evaluations of negative targets in response to negative affective primes. No increase in intuitive affect regulation due to subliminal self priming was predicted for state-oriented participants. Study 1 provided an initial test of these predictions. Study 2 sought to replicate Study 1 and examined whether similar effects could be obtained with supraliminal self primes.

Study 1

Method

Participants and Design

Fifty paid volunteers from the Vrije Universiteit Amsterdam (22 women and 28 men,[1] average age 21) participated in the study. The design was 2 (Orientation: action vs. state; between participants) × 2 (Self Prime: yes vs. no; within participants) × 2 (Affective Prime: positive vs. negative; within participants) × 2 (Target Valence: positive vs. negative; within participants) mixed factorial. The main dependent variable consisted of response latencies in the affective priming task.

Procedure and Materials

Upon arrival in the laboratory, participants were led to individual cubicles, each containing a computer. The experimenter explained that the instructions of the present research would be administered via a computer-program and left. Participants started the program by pressing a button on the keyboard. Participants were first informed that the investigation would consist of a number of unrelated studies, which were supposedly administered together for efficiency reasons. Participants first completed a set of personality questionnaires that included an assessment of individual differences in action versus state orientation and some other personality traits. Participants subsequently performed an affective priming task. Finally, participants supplied some biographical information, and were thanked, debriefed, and paid.

Assessment of action versus state orientation. Individual differences in action versus state orientation were assessed by the demand-related[2] subscale (AOD) of the Action Control Scale (ACS90). The ACS90 has been developed and extensively validated by Kuhl and associates (Kuhl, 1994; see Diefendorff, Hall, Lord, & Strean, 2000; Koole & Kuhl, in press; Kuhl & Beckmann, 1994, for reviews). Effects of the ACS90, have been found across a wide range of different measures and domains, including intention memory, physiological arousal, medicine intake, therapeutic outcomes, athletic performance, and work psychology. Moreover, the effects of the ACS90 are not due to self-efficacy (Diefendorff, 2004), implicit or explicit achievement motivation (Heckhausen & Strang, 1988; Jostmann & Koole, 2006), neuroticism (Baumann & Kuhl, 2002), self-esteem (Koole, 2004), conscious emotion regulation strategies (Koole & Jostmann, 2004), or any of the "Big Five" personality dimensions (Diefendorff et al., 2000).

The AOD scale has 12 items (Cronbach's alpha = .74). An illustrative item is: "When I know I must finish something soon: A. I have to push myself to get started.

B. I find it easy to get it over and done with''. In this example, the action-oriented option is B (in the actual scale, the order of action- versus state-oriented choices was counter-balanced; for the other AOD items, see Diefendorff et al., 2000). Action-oriented choices were coded as ''1'', whereas state-oriented choices were coded as ''0'' and summed for the entire subscale. Participants who made 7 or more action-oriented choices were assigned to the action-oriented group ($N = 21$); participants who made 6 or fewer action-oriented choices were assigned to the state-oriented group ($N = 29$).[3]

Other individual differences. Our personality assessment also included the Threat-related subscale of the ACS90 (AOT; Cronbach's alpha = .78) and measures of extraversion and neuroticism. The latter two measures were based on Hofstee, De Raad, and Goldberg (1992). For the extraversion scale (Cronbach's alpha = .79), there were three adjectives indicating high extraversion (*outgoing*, *spontaneous*, and *open*) and six adjectives indicating low extraversion (*closed*, *introverted*, *surly*, *reserved*, *inscrutable*, and *inaccessible*). For the neuroticism scale (Cronbach's alpha = .81), there were three adjectives indicating low neuroticism (*sober-minded*, *imperturbable*, *and cool*) and six adjectives indicating high neuroticism (*panicky*, *emotional*, *overly sensitive*, *nervy*, *sentimental*, and *hypersensitive*).

Affective priming task. The affective priming task was modeled after Fazio et al. (1986) and Koole and Fockenberg (2006). The task was described as a study on the evaluation of words. During each trial, a row of four Xs would appear in the center of the computer screen. After this, a prime word was flashed on the computer screen for 17 ms. During one half of the trials, the prime word was self-related (''ik'', which means ''I'' in Dutch). During the remaining trials, the prime word was neutral (''de'' which means ''the'' in Dutch). The subliminal prime was immediately overwritten by a second row of four Xs that remained on screen for 1000 ms. The rows of Xs served as a fixation point and as forward and backward masks of the intervening priming word. Next, an affective prime word appeared on the computer screen for 200 ms. Participants were told to ignore these briefly appearing words, as they were merely meant to serve as distracters. After the affective prime word disappeared, the computer screen went blank for 100 ms before the appearance of the target word. Thus, the SOA was 300 ms.

As soon as the target word appeared, participants were to indicate the valence of the sentence as quickly and accurately as possible. Participants were to press the ''a'' button (placed to the extreme left of the keyboard) when the target word was negative or the ''6'' button (placed on the number pad to the extreme right of the keyboard) when the target word was positive. The target word disappeared from the screen after participants responded. At that point, the computer screen went blank for one second before the onset of the next trial. The affective priming task began with 4 warm-up trials, followed by 24 experimental trials. The trials were presented in a different random order for each participant.

The stimuli for the affective priming task were pilot-tested in previous research (Koole & Fockenberg, 2006). The negative primes were: *alleen* (alone), *kwaad* (angry), *straf* (punishment), *streng* (authoritarian), *dwang* (force), and *schelden* (to scold). The positive primes were: *eer* (honor), *liefde* (love), *aandacht* (attention), *aardig* (kind), *beloning* (reward), and *vrienden* (friends). The negative targets were: *haat* (hate), *schuldig* (guilty), *schaamte* (shame), *ruzie* (quarrel), *slaan* (to hit), and *verlaten* (abandoned). The positive targets were: *trots* (proud), *vrede* (peace), *samen*

(together), *vertrouwen* (trust), *geven* (to give), and *gezellig* (cozy). Notably, the stimuli were all related to social rewards or punishments, in line with our theoretical assumption that intuitive affect regulation is socially conditioned (Koole & Kuhl, in press). All affective primes and targets appeared twice, once with a subliminal self prime and once with a subliminal neutral prime. The trials of the affective priming task were presented in a different random order for each participant.

Results

Before the main analysis, we removed wrong responses (4.2% of all responses) from the dataset. To reduce the role of outliers, we replaced responses >1500 ms by 1500 ms (4.0% of all responses) and responses <300 ms by 300 ms (0.09% of all responses). Notably, we obtained equivalent results when we deleted outliers from the dataset or log-transformed the evaluation latencies.

We subjected average evaluation latencies to a 2 (orientation) $\times$ 2 (self prime) $\times$ 2 (affective prime) $\times$ 2 (target valence) analysis of variance (ANOVA). Relevant means are displayed in Table 1. The analysis yielded a marginal effect of target valence, which indicated that positive targets were evaluated more quickly than negative targets, $F(1, 48) = 3.43$, $p = .070$ ($M = 766$ vs. $M = 790$). The analysis further revealed a marginal interaction between orientation, self prime, and target valence, $F(1, 48) = 3.35$, $p = .073$, and a significant interaction between orientation, affective prime, and target valence, $F(1, 48) = 6.19$, $p < .02$. Most importantly, there was a significant interaction between orientation, self prime, affective prime, and target valence, $F(1, 48) = 5.51$, $p < .03$. To interpret this four-way interaction, we analyzed the results by self prime condition.

In the self-priming conditions, a 2 (orientation) $\times$ 2 (affective prime) $\times$ 2 (target valence) ANOVA yielded an interaction between orientation and target valence, $F(1, 48) = 4.47$, $p = .073$, and the predicted three-way interaction between orientation, affective prime, and target valence, $F(1, 48) = 12.58$, $p < .002$. To further understand this effect, we analyzed the results separately for positive and negative primes. Following positive primes, there were no significant effects, Fs < 1. Following negative primes, there was a significant interaction between orientation and target valence, $F(1, 48) = 30.44$, $p < .001$. The latter effect implied that action- versus state-oriented participants responded differently to negative primes. Following negative

TABLE 1 Average Evaluation Latencies in Milliseconds as a Function of Orientation, Subliminal Self Prime, Affective Prime, and Target Valence (Study 1)

	Affective prime valence			
	Positive target valence		Negative target valence	
	Positive	Negative	Positive	Negative
Subliminal self prime				
Action orientation	762 (163)	730 (163)	693 (116)	802 (151)
State orientation	779 (294)	799 (243)	853 (241)	768 (198)
Subliminal non-self prime				
Action orientation	749 (159)	763 (155)	739 (155)	765 (129)
State orientation	792 (284)	862 (262)	840 (254)	805 (209)

primes, state-oriented participants were significantly slower to evaluate positive rather than negative targets, $F(1, 20) = 10.77$, $p < .005$ ($M = 853$ vs. $M = 768$). Action-oriented participants displayed the opposite pattern. Following negative primes, action-oriented participants were significantly faster to evaluate positive rather than negative targets, $F(1, 28) = 21.86$, $p < .001$ ($M = 693$ vs. $M = 802$).

In the non-self-priming conditions, a 2 (orientation) × 2 (affective prime) × 2 (target valence) ANOVA only yielded a marginal effect of target valence, $F(1, 48) = 3.70$, $p = .060$. Positive targets were evaluated more quickly than negative targets ($M = 768$ vs. $M = 802$). No other effects were significant, $ps < 1$.

Supplementary analyses. AOD was significantly positively correlated with AOT, $r(50) = .46$, and significantly negatively correlated with neuroticism, $r(50) = -.47$ (both $ps < .002$). AOD was not significantly correlated with extraversion, $r(50) = .16$, $p = .267$. When we repeated our analyses with AOT instead of AOD, we found a four-way interaction between orientation, self prime, affective prime, and target valence that paralleled the pattern obtained for AOD, $p < .05$. The AOT scale may have had a parallel effect because of its strong correlation with the AOD scale. However, because we only predicted effects of AOD, it remained to seen whether this effect could be replicated. Neither extraversion nor neuroticism yielded equivalent effects as AOD.

Discussion

As expected, subliminally priming the self differentially influenced action- versus state-oriented individuals in their responses to negative affective primes. When action-oriented participants were subliminally primed with the self, they responded to negative primes with slower evaluations of negative rather than positive targets. This pattern is consistent with an attentional switch away from negative affect and towards positive affect. Subliminal self primes thus triggered intuitive affect regulation among action-oriented participants.

Subliminal self priming led to the opposite pattern among state-oriented participants. Indeed, when subliminally primed with the self, state-oriented participants responded to negative primes with faster evaluations of negative rather than positive targets. This pattern is consistent with persistence of negative affect. Although we did not anticipate this effect, Koole and Kuhl (2003) reasoned on theoretical grounds that activating the implicit self in a negative context increases the likelihood that the self makes contact with painful experiences (see also Kaschel & Kuhl, 2003; Rosahl, Tennigkeit, Kuhl, & Haschke, 1993). Because state-oriented individuals do not have well-developed affect regulation skills, implicit self-activation might render them more vulnerable in the confrontation with negative affect. However, the effects of subliminal self priming among state-oriented individuals were unexpected. It was therefore important to establish if we could replicate these effects in Study 2.

Notably, Study 1 failed to find an overall affective priming effect. It is conceivable that the subliminal self primes somehow inhibited the emergence of an overall affective priming effect. It should be noted, however, that lack of an overall affective priming effect does not invalidate the finding of intuitive affect regulation in Study 1. Indeed, three recent experiments found intuitive affect regulation in an affective-priming task regardless of whether an overall affective priming was present, absent, or even reversed (Koole & Fockenberg, 2006). These findings suggest

that intuitive affect regulation and overall affective priming effects are driven by distinct mechanisms. Intuitive affect regulation is presumably driven by dynamic self-regulation processes (Koole & Kuhl, in press), whereas overall affective priming effects probably result from response competition (Klauer & Musch, 2003).

Study 2

In Study 2, we sought to replicate the main findings of Study 1. Moreover, we added a condition with supraliminal self primes to the experimental design, to see if these would induce analogous effects as the subliminal priming manipulation. The model of intuitive affect regulation assumes that implicit self-representations are more strongly associated with emotion systems than explicit self-representations (Koole & Kuhl, in press; Kuhl, 2000). We thus expected that subliminal self primes would elicit stronger effects on intuitive affect regulation than supraliminal self primes.

Method

Participants and Design
Seventy-four paid volunteers from the Vrije Universiteit Amsterdam (38 women and 36 men, average age 21) participated in the study. The design was 2 (Orientation: action vs. state; between participants) × 2 (Self Prime Duration: 17 ms vs. 300 ms; between participants) × 2 (Self Prime: yes vs. no; within participants) × 2 (Affective Prime: positive vs. negative; within participants) × 2 (Target Valence: positive vs. negative; within participants) mixed factorial. The main dependent variable consisted of response latencies in the affective priming task.

Procedure and Materials
The assessment of AOD (Cronbach's alpha = .73) and AOT (Cronbach's alpha = .79), procedure and materials were largely the same as in Study 1. On the basis of their AOD scores, 40 participants were classified as action-oriented and 34 participants as state-oriented.

Study 2 differed from Study 1 in three respects. First, we added an experimental group for which the self primes were presented for 300 ms rather than 17 ms. Second, instead of measuring extraversion and neuroticism, we administered the Rosenberg Self-Esteem Scale (Cronbach's alpha = .84). Third, after the personality assessment, we measured participants' moods using the abbreviated Profile of Mood Scales (POMS; Shacham, 1983). The 32 POMS items were coded such that higher scores indicated more negative mood and averaged into a single index (Cronbach's alpha = .93).

Results

Before the main analysis, we removed wrong responses (8.0% of all responses) from the data set. We also replaced responses >1500 ms with 1500 ms (6.3% of all responses) and responses <300 ms with 300 ms (0.04% of all responses). The results were highly similar when we deleted these outliers or log-transformed the response latencies.

We subjected average evaluation latencies to a 2 (orientation) × 2 (self prime duration) × 2 (self prime) × 2 (affective prime) × 2 (target valence) ANOVA. This analysis revealed the predicted five-way interaction between orientation, self prime

duration, self prime, affective, $F(1, 70) = 4.33$, $p < .05$. To unpack this interaction effect, we analyzed our results separately by self prime duration.

Subliminal self prime conditions. In the subliminal self prime conditions, we conducted a 2 (orientation) × 2 (self prime) × 2 (affective prime) × 2 (target valence) ANOVA. This analysis yielded an interaction between orientation and target valence, $F(1, 38) = 8.30$, $p < .007$, and the predicted interaction between orientation, self prime, affective prime, and target valence, $F(1, 38) = 7.80$, $p < .009$. Relevant means to this interaction are displayed in Table 2. We further analyzed this effect by self prime.

In the subliminal self-priming conditions, a 2 (orientation) × 2 (affective prime) × 2 (target valence) ANOVA yielded the predicted interaction between orientation, affective prime, and target valence, $F(1, 38) = 7.85$, $p < .009$. To further understand this effect, we analyzed the results separately by affective prime. Following positive primes, there were no significant effects, $ps > .21$. Following negative primes, there was a significant interaction between orientation and target valence, $F(1, 38) = 7.95$, $p < .009$. This interaction implied that action- versus state-oriented individuals responded differently to negative primes. Following negative primes, state-oriented participants were non-significantly slower to evaluate positive rather than negative targets, $F(1, 17) = 2.38$, $p = .141$ ($M = 846$ vs. $M = 784$). Action-oriented participants displayed the opposite pattern. Following negative primes, action-oriented participants were significantly faster to evaluate positive rather than negative targets, $F(1, 21) = 7.19$, $p = .014$ ($M = 740$ vs. $M = 805$).

In the subliminal non-self-priming conditions, a 2 (orientation) × 2 (affective prime) × 2 (target valence) ANOVA yielded a significant interaction between orientation, prime valence, and target valence, $F(1, 38) = 8.02$, $p < .008$. To further understand this effect, we analyzed the results separately by affective prime. Following negative primes, there were no significant effects, $ps > .27$. Following positive primes, there was a significant interaction between orientation and target valence, $F(1, 38) = 9.15$, $p < .004$. This interaction implied that action- versus state-oriented individuals responded differently to positive primes. Following positive primes, state-oriented participants were significantly slower to evaluate positive rather than negative targets, $F(1, 17) = 7.64$, $p < .02$ ($M = 857$ vs. $M = 763$). Action-oriented participants displayed the opposite pattern. Following positive primes,

TABLE 2 Average Evaluation Latencies in Milliseconds as a Function of Orientation, Subliminal Self Prime, Affective Prime, and Target Valence (Study 2)

	Affective prime valence			
	Positive target valence		Negative target valence	
	Positive	Negative	Positive	Negative
Subliminal self prime				
Action orientation	830 (178)	795 (227)	740 (127)	805 (184)
State orientation	799 (246)	833 (289)	846 (350)	784 (225)
Subliminal non-self prime				
Action orientation	754 (173)	812 (205)	793 (189)	797 (176)
State orientation	857 (300)	763 (258)	855 (274)	792 (252)

action-oriented participants were non-significantly faster to evaluate positive rather than negative targets, $F(1, 20) = 2.57$, $p = .124$ ($M = 755$ vs. $M = 812$). Because the latter effects did not emerge in Study 1, caution is warranted in interpreting the findings in the subliminal non-self-priming conditions.

Supraliminal self-prime conditions.   In the supraliminal self prime conditions, we conducted a 2 (orientation) × 2 (self prime) × 2 (affective prime) × 2 (target valence) ANOVA. There was a main effect of target valence, $F(1, 32) = 4.15$, $p = .050$, which indicated that positive targets were evaluated more quickly than negative targets ($M = 773$ vs. $M = 803$). There was also a main effect of affective prime, $F(1, 32) = 6.30$, $p < .02$, which indicated that evaluations were quicker after positive than after negative primes ($M = 766$ vs. $M = 809$). There was a significant interaction between affective prime and target valence, $F(1, 32) = 8.19$, $p < .008$. In line with the affective priming effect, evaluations were quicker when they were preceded by congruent rather than incongruent affective primes ($M = 772$ vs. $M = 803$). Finally, there was an interaction between self prime and affective prime, $F(1, 32) = 5.20$, $p < .03$. Positive primes led to quicker evaluations than negative primes when the affective primes were preceded by self primes, $F(1, 33) = 9.33$, $p < .005$ ($M = 755$ vs. $M = 824$), but not when affective primes were preceded by non-self primes, $F(1, 33) = <1$.

Supplementary analyses.   AOD was not reliably correlated with AOT, self-esteem, or negative mood, $ps > .12$. AOT was negatively correlated with negative mood, $r(74) = -.33$, $p < .005$. The effects of AOT, self-esteem, or negative mood did not parallel the effects of AOD.

Discussion

As in Study 1, the results of Study 2 showed that subliminal self primes led to intuitive affect regulation among action-oriented participants and persistence of negative affect among state-oriented participants. Study 2 further demonstrated that supraliminal self primes did not induce the same effects as subliminal self primes. Thus, differential affect regulation processes among action-oriented versus state-oriented participants were specifically triggered by subliminal self-activation. Finally, a general affective priming effect emerged when the affective priming task included supraliminal self primes, but not when the task included subliminal self primes. This set of findings is important, because it indicates that the affective priming stimuli in the present research were sufficiently strong to elicit affective priming (cf. Koole & Fockenberg, 2006). The subliminal self primes in Studies 1 and 2 may have disrupted the emergence of an overall affective priming effect, perhaps by inducing general increases in self-regulation (Macrae et al., 1998). This possibility may be tested in future research.

General Discussion

In the present research, we examined the role of the implicit self in affect regulation among action- versus state-oriented individuals. In two studies, we measured action versus state orientation and manipulated subliminal exposure to self primes in an affective priming task (Fazio et al., 1986). Intuitive affect regulation was indexed by faster evaluations of positive targets and slower evaluations of negative targets in

response to negative affective primes (Koole & Fockenberg, 2006). Persistence of negative affect was indexed by slower evaluations of positive targets and faster evaluations of negative targets in response to negative affective primes. The results showed that subliminal self primes led to intuitive affect regulation among action-oriented individuals and persistence of negative affect among state-oriented individuals (Studies 1 and 2). Supraliminal self primes had no differential effects on action- versus state-oriented individuals (Study 2).

The present research provides further support for the model of intuitive affect regulation (Koole & Kuhl, in press). Previous research found correlational evidence that implicit self-representations mediate the unfolding of intuitive affect regulation processes among action-oriented individuals (Koole & Jostmann, 2004). The present research goes beyond this earlier work by demonstrating the causal role of the implicit self in triggering intuitive affect regulation among action-oriented individuals. Moreover, previous research used a response-latency measure of self-activation that did not completely rule out a potential influence of conscious self-reflection. By using a subliminal priming technique to manipulate activation of the implicit self, the present research demonstrates more conclusively that intuitive affect regulation among action-oriented individuals is under the control of the implicit self.

The implicit self triggered very different processes among state-oriented individuals, who displayed persistence of negative affect after subliminal self priming. This pattern of effects might seem counterintuitive. Nevertheless, these effects fit with previous observations. State-oriented individuals normally do not activate the implicit self when they are coping with negative affect (Koole & Jostmann, 2004). As the present findings indicate, state-oriented individuals may have good reasons to eschew this strategy. Activating the implicit self in a negative context may initially increase the likelihood that the self makes contact with negative experiences (Kaschel & Kuhl, 2003; Koole & Kuhl, 2003; see Koole & Fockenberg, 2006; Rosahl et al., 1993, for evidence). Down-regulation of this negative affect occurs in a subsequent stage, but only when the implicit self has strong connections with the person's emotion systems. Without strong intuitive affect regulation skills, activating the implicit self in a negative context may therefore increase persistence of negative affect. Using the implicit self in coping with negative affect thus appears to be a risky strategy for state-oriented individuals.

On the basis of the present research, one might wonder if the implicit self invariably undermines affect regulation among state-oriented individuals. Fortunately, a more optimistic conclusion is possible. It should be noted that the present research manipulated the implicit self on a trial-by-trial basis. The effects of the implicit self were thus measured on a *phasic* timescale (i.e., within a few seconds or less). The phasic timescale fits well with the self-regulatory style of action-oriented individuals, which is characterized by very rapid and dynamic processing (Koole & Kuhl, in press). However, the phasic timescale does not fit very well with the self-regulatory style of state-oriented individuals, which is characterized by relatively slow and static processing. It is therefore conceivable that state-oriented individuals may benefit from the implicit self on a slower timescale.

We recently examined the consequences of subliminal self-activation on a tonic timescale (i.e., over several minutes; Koole & Heslenfeld, 2006). In this study, a group of action- versus state-oriented participants performed a similar affective priming task to that in the present research. This time, however, participants repeated the task 10 consecutive times. The results during the first blocks replicated the present research: subliminal self-activation activated intuitive affect regulation

among action-oriented individuals and persistence of negative affect among state-oriented participants. After the third block, however, the pattern shifted: subliminal self-activation no longer influenced action-oriented participants but exerted a significant influence on state-oriented participants, who displayed increased activation of positive affect in response to subliminal self-activation. These initial findings suggest that more extended activation of the implicit self may have more beneficial consequences among state-oriented individuals.

The differential effects of short versus long activation of the implicit self can be explained in terms of the model of intuitive affect regulation (Koole & Kuhl, in press; see Figure 1). Presumably, action-oriented individuals have strong associations between the implicit self and emotion systems. Consequently, action-oriented individuals need only minimal amounts of activation to mobilize the affect regulation resources of the implicit self. By contrast, state-oriented individuals are presumed to have weak associations between the implicit self and emotion systems. State-oriented individuals will therefore need greater amounts of activation to mobilize the affect regulation resources of the implicit self. In practice, these rather subtle processing differences imply that state-oriented individuals require more extended support from their social environment (e.g., their significant others) than action-oriented individuals. Past work has indeed found that external motivational support is more beneficial to state-oriented individuals than to action-oriented individuals (see Koole, Kuhl, Jostmann, & Vohs, 2005).

In more general terms, the present findings have important implications for the theoretical understanding of the implicit self. As discussed earlier, most theories to date suggested that the implicit self is entirely based on simple associations (e.g., Greenwald et al., 2002). Nevertheless, the present findings are difficult to explain in terms of simple associative processing. Priming the implicit self led action-oriented individuals to respond with faster evaluations of positive targets and slower evaluations of negative targets after negative affective primes. In associative terms, this would imply that action-oriented individuals have automatic associations between positive and negative affect. The latter seems theoretically implausible, and is at odds with findings in Study 2 showing that, in the absence of subliminal self primes, action-oriented individuals displayed automatic priming of negative affect. The present findings are therefore consistent with models that attribute more complex, integrative functions to the implicit self (Koole & DeHart, in press; Kuhl, 2000).

The present research further supports the notion that the self has important affect regulation functions. This notion has been put forward by various theorists of the self (e.g., Brown & Dutton, 1995; Conner & Barrett, 2005; Higgins, 1987; Tesser, 2000). A prominent theory in this regard is Tesser's (2000) confluence model, which holds that various self-esteem maintenance mechanisms help individuals to maintain an affective balance. Like the model of intuitive affect regulation, the confluence model assumes that the self can facilitate affect regulation, and that this process often occurs on implicit levels. However, intuitive affect regulation is assumed to support efficient self-regulation (or action control) rather than self-esteem maintenance. Consistent with this, action orientation has been linked to more efficient self-regulation, especially under stressful conditions (Jostmann & Koole, 2006, in press). By contrast, self-esteem maintenance has been found to interfere with self-regulation under stressful conditions (Baumeister, Heatherton, & Tice, 1993). Thus, although intuitive affect regulation bears some surface similarity with self-esteem main-tenance, the two processes are likely to be driven by distinct underlying mechanisms.

The present research is not without limitations. First, our operationalization of action versus state orientation was correlational rather than experimental. Action orientation can be increased through therapy (Schulte, Hartung, & Wilke, 1997) or directed exercise (Stiensmeier-Pelster & Schürmann, 1994). It would thus be important to establish whether situationally induced action orientation yields similar effects as chronic action orientation. Second, the present research used only one type of self prime (the word "I" in Dutch). Future work should address the impact of other self-related stimuli on affect regulation. For example, personal names or name letters might be strong primes of the implicit self (Koole & Pelham, 2003). Finally, the present research relied exclusively on the affective priming task to assess affect regulation. Future work should include different implicit and explicit measures to document the influence of the implicit self on affect regulation.

Concluding Remarks

Psychologists have long known that the self is closely tied up with people's emotions. The present research adds to this that the self can even regulate people's emotional reactions on implicit levels. Activating the implicit self was found to promote efficient affect regulation among action-oriented individuals and persistence of negative affect among state-oriented individuals. The implicit self may thus play an important role in people's emotional lives.

Notes

1. In Studies 1 and 2, we found no effects of gender. Consequently, this factor was dropped from the analyses.
2. Kuhl (1994) introduced the labels "failure-related" and "decision-related" action orientation to what we refer to as "threat-related" and "demand-related" action orientation, respectively. The new labels map directly on to relevant constructs within PSI theory (e.g., Kuhl, 2000).
3. Equivalent results were obtained when AOD scores were used as continuous variables in regression analyses that paralleled the ANOVAs reported in the main body of this article. Because a regression approach made it impossible to inspect the absolute means in Studies 2 and 3, we report the ANOVA results in the main body of this article.

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