

Research Article

ATTENTIONAL MECHANISMS LINKING REJECTION TO HOSTILE REACTIVITY: The Role of “Hot” Versus “Cool” Focus

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Abstract—Drawing on the hot-cool systems analysis of self-regulation, we examined whether attentional focus mediates the negativity of cognitive-affective reactions to interpersonal rejection. The hypothesis was that whereas a hot, arousing focus to representing rejection experiences should increase anger-hostility, accessing the cool system through distraction and distancing should attenuate such responses. Participants imagined an autobiographical rejection experience, focusing either on their physiological and emotional reactions (hot focus) or on the physical setting of the experience (cool focus). Participants in a third condition received no specific attentional instructions. Both implicit and explicit measures showed that hostile thoughts and feelings were attenuated in the cool-focus compared with the hot-focus condition. The findings support the adaptive value of activating a cooling strategy under hot, arousing conditions that otherwise elicit automatic, hot-system responses.

Cumulative evidence from social-cognitive, developmental, and cognitive neuroscience research indicates that attention plays an important role in effective self-regulation (Baumeister, Heatherton, & Tice, 1994; Derryberry & Rothbart, 1988, 1997; Eisenberg, Fabes, Guthrie, & Reiser, 2000; Gross, 2001; Metcalfe & Mischel, 1999; Mischel, Shoda, & Rodriguez, 1989; Nolen-Hoeksema, 1991; Wilson & Gottman, 1996). Specifically, whereas attentional focus on the arousing, emotional, “hot” aspects of situations makes effective self-regulation difficult, use of “cooling” strategies such as distraction and abstraction facilitates emotional regulation and the control of impulsive behavioral tendencies.

Experimental studies of children’s ability to delay immediate gratification indicate that attentional cooling strategies help dampen frustrative arousal inherent in the delay task, enabling resistance to temptation and effective regulation of appetitive impulses (Mischel et al., 1989). Correlational studies suggest that the cooling mechanisms that are critical to self-regulation in the delay-of-gratification task may also protect individuals who defensively expect and intensely react to rejection from such maladjusted outcomes as aggression and low self-esteem (Ayduk et al., 2000). Nevertheless, experimental investigations of the role of cooling processes in the regulation of impulses associated with defensive, fight-or-flight mechanisms are relatively scarce (cf. Rusting & Nolen-Hoeksema, 1998). To address this gap, in this study we experimentally investigated the effects of attention deployment to cool, distracting cues as opposed to emotional, arousing information on attenuating hostile responses to rejection.

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ATTENTIONAL CONTROL AND THE HOT-COOL MODEL OF SELF-REGULATION

Attentional processes in self-regulation of appetitive impulses have been most extensively examined in the classic preschool delay-of-gratification paradigm (Mischel et al., 1989). This task taps individual differences in children’s ability to forgo an immediate but less desired outcome for the sake of a preferred outcome contingent on waiting (e.g., one cookie now vs. two cookies later). The number of seconds children can wait in this delay situation predicts their cognitive and social competence years later (Mischel, Shoda, & Peake, 1988; Shoda, Mischel, & Peake, 1990). Experimental studies examining the underlying mechanisms of this ability have shown that when children psychologically distance themselves from the consummatory, hot qualities of the reward (e.g., taste of the cookies) by either focusing on cool, cognitive cues about the stimulus (e.g., shape and color of the cookies) or engaging in self-distraction (e.g., thinking fun thoughts), delay becomes easier. Presumably, distraction from or abstraction of the consummatory information reduces children’s frustrative arousal and the difficulty of waiting, and prevents the enactment of impulsive responses (Mischel, 1974; Mischel et al., 1989). Overall, then, these studies suggest that cooling attentional strategies may play a causal role in the control of consummatory impulses when the appetitive system is activated.

There is now indirect evidence that cooling attentional processes that underlie delay ability also help in the regulation of defensive reactions. Recently, the role of delay ability was examined in the context of rejection sensitivity (RS; Downey & Feldman, 1996)—a chronic processing disposition characterized by anxious expectations of rejection. Although this disposition is typically linked to both hostile and depressive reactivity to rejection (Ayduk, Downey, & Kim, 2001; Ayduk, Downey, Testa, Yen, & Shoda, 1999; Downey, Freitas, Michaelis, & Khouri, 1998), childhood delay ability buffered both adults and preadolescents high in RS against aggression, low self-esteem, and interpersonal difficulties (Ayduk et al., 2000). Likewise, a cross-sectional study of preadolescent boys at risk for aggression showed that the spontaneous use of cooling strategies in the delay task (i.e., looking away from the rewards and self-distraction) predicted reduced verbal and physical aggression (Rodriguez, Shoda, Mischel, & Wright, 1989). Together, these studies begin to suggest that attentional control mechanisms that help cool impulses associated with the appetitive system can also reduce the reactivity of the defensive motivational system.

Developmental and social-cognitive research points at similar attentional processes in regulating negative affect and behavior. For example, eye-gaze aversion, flexible attention shifting, attention focusing, and resistance to attentional interference are related to reduced impulsivity and anger even in early childhood (Eisenberg et al., 2000; Gerardi, Rothbart, Posner, & Kepler, 1996; Johnson, Posner, & Rothbart,

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1991). Likewise, social-cognitive research indicates that whereas processes such as emotion-focused rumination maintain and prolong negative affect, self-distraction may be an effective strategy to assuage negative mood (Nolen-Hoeksema, 1991; Rusting & Nolen-Hoeksema, 1998; Tice & Baumeister, 1993).

On the basis of the delay-of-gratification studies, and as suggested by these diverse areas of research, the role of attentional focus in self-regulation has been formalized within a framework that distinguishes between a cognitive, *cool* system and an emotional, *hot* system (Metcalf & Mischel, 1999) that may be linked to distinctive areas of the brain (Metcalf & Jacobs, 1998; Posner & Rothbart, 2000). The hot system is specialized for quick emotional processing; it generates largely unmediated reflexive approach-avoidance reactions to biologically significant, hot stimuli in the environment (both negative and positive) that trigger it. The cool system, in contrast, is specialized for complex spatiotemporal and episodic representation; it is the locus of cognitive mediational processes, generating thoughtful reflective reactions. It is argued that the evolutionary adaptive value of the hot system comes from allowing quick fight-or-flight responses under threat conditions without the need for time to think (Metcalf & Jacobs, 1998; Metcalf & Mischel, 1999). Such an emergency system can become maladaptive, however, if activated indiscriminately in situations that require patience and reflective, strategic behavior or when the threat is not real. The hot-cool model predicts that focusing on those features of stimuli that increase arousal (i.e., positive arousal in approach and negative arousal in defensive behaviors) activates hot-system processing and, thus, should lead to automatic, reflexive responses. By contrast, effective self-regulation should be possible by flexible and strategic attention deployment on features that allow one to access the cool system and attenuate hot-system arousal and, thus, to break reflexive stimulus-response contingencies. Given the correlational nature of prior research on attentional control of defensive responses (Ayduk et al., 2000; Rodriguez et al., 1989), the potential causal role of attention in determining reactions to rejection remains to be investigated. Experimentally establishing such a causal link would help identify protective mechanisms and point to potential interventions aimed at reducing hostile over-reactions to rejection.

PRESENT STUDY

To examine the effect of attentional focus on hostile responses to rejection, we first primed participants experimentally with rejection thoughts by asking them to recall a significant and very hurtful rejection they had experienced in the past. Following recall, they were instructed to focus either on the physiological and emotional reactions that they felt during the experience or on the characteristics of the physical setting where this experience happened. These instructions were derived from Metcalf and Jacobs's (1996, 1998) descriptions of the encoding processes that characterize the hot and the cool memory systems (i.e., emotional and spatiotemporal information, respectively), and were illustrative rather than exhaustive of the different strategies that could potentially activate hot versus cool processing. Participants in a control condition did not receive any instructions that specified how they should think about the rejection experience.

To assess the impact of the experimental manipulation on the accessibility of hostility, we measured participants' reactions times to hostility words in a lexical decision task. Additionally, participants

completed a short angry-mood questionnaire and wrote essays describing their thoughts and imagery during the experiment. Thus, the robustness of the results was examined by assessing reactivity with both implicit (i.e., lexical decision time) and explicit (self-reported mood and essays) measures.

We hypothesized that construing rejection in terms of its emotion-arousing aspects should elicit hostility to a greater extent than thinking of rejection in terms of its cool, distracting, and psychologically distancing features. Because participants were asked to recall an intense rejection experience to start with, we expected the results for the control condition to be similar to those for the hot-focus condition.

Prior research on accessibility had shown that momentary activation of strong psychological states tends to override the effect of chronic individual differences on behavior (e.g., Higgins, 1990). The implication for the individual difference dimension in our study, RS, was that the attentional-focus primes would affect high- and low-RS people similarly. Nonetheless, it was possible that the strength of these manipulations would be moderated by individual differences in RS because it might be easier for low-RS people to adopt a cool focus and for high-RS people to adopt a hot focus. Therefore, we also assessed RS to test these alternative possibilities.

Method

Sample and procedure

Two hundred seventy-three Columbia University undergraduates (120 men; mean age = 21.84 years) participated individually in two waves of data collection, 1 year apart. They received either course credit ($n = 121$) or \$6 for their time. The results reported did not change as a function of sample, and thus the data were collapsed across the two waves.

Participants first completed the Rejection Sensitivity Questionnaire (RSQ; described later), interspersed among four other questionnaires. Participants took approximately 15 to 20 min to complete these questionnaires and then, in a different room, participated in the computerized part of the study, which was framed as a separate study on imagery and linguistic processing. Participants were seated in front of a computer, and were instructed to play a cassette tape recording that would guide them through the experiment in conjunction with the instructions presented on the computer. They were then left alone.

The taped instructions started with an explanation of the lexical decision paradigm (described later). After a short practice session of the lexical decision task, participants were asked to recall an experience from their own past that had made them feel intensely rejected, excluded, or abandoned. They were asked to stop the tape then and start it again immediately after they recalled such an event. At this point, the recorded instructions diverged: Participants heard either the *hot-focus* ($n = 85$; 42 men) or the *cool-focus* ($n = 88$; 38 men) instructions or were given *no instructions* ($n = 100$; 40 men). They were then given 45 s to think about and imagine the rejection experience. Following this imagery task, they completed the first lexical decision task.

After completing that task, participants were given the same manipulation instructions and were asked to think about the rejection experience again for 30 s. This was done to prevent attenuation of the manipulation effect. Participants then completed the lexical decision task for a second word list. Next, they were instructed to turn off the tape and complete a questionnaire packet that contained a self-report

mood assessment and a blank page on which they were to describe the recalled experience in detail.

Measures and materials

Attentional focus manipulation. In the hot-focus condition, participants were instructed to focus on the feelings and the visceral responses the event triggered, as if they were an actor trying to communicate the emotional drama of their experience (e.g., “Think about your experience in terms of the feelings and the emotions involved. How did your heart beat? How did your face feel? What sensations did you feel? Let yourself feel the event as if you were right there, reliving it and reexperiencing it.”). In the cool-focus condition, participants were asked to focus on the context-related information of their rejection experience, as if they were a set designer trying to capture a picture of the event (e.g., “Think about your event in terms of its objects and the spatial relations between them. Where were you standing with respect to the people and the objects around you? What’s the lighting like? Where did it take place? Let yourself picture the event as if you were right there, in photographic detail.”). In the no-instructions condition, participants were just told to “imagine this event.”

Lexical decision task. The purpose of this task was to assess the accessibility of hostility and anger. Each trial of the task began with a star presented in the middle of the screen for 500 ms. The target stimulus then appeared in the same location, remaining there until the participant indicated whether the stimulus was a word or nonword. A blank screen followed for 500 ms, and then the next trial began. The time elapsed from the presentation of each stimulus until a response was made, accurate to 1 ms, was recorded by a PsyScope button box. Reaction time on this measure is assumed to reflect the accessibility of target constructs: The faster the reaction time, the more accessible the target construct represented by a particular word.

For each lexical decision task, participants made lexical decisions for one of two lists of 60 experimental stimuli, with order of presentation of the lists counterbalanced across subjects. Within each list, the stimuli were randomized: 15 hostility words, 15 negative words, 15 neutral words, and 15 nonwords. The results reported did not change as a function of order of presentation. The attentional-focus manipulation did not affect reaction times differently in the two lexical decision tasks; thus, the data across the two sessions were collapsed.

The stimuli (see Table 1) were selected on the basis of pilot work. At least four of five independent judges categorized hostility words as both negative and related to hostility, negative words as negative in valence but unrelated to hostility, and neutral words as both neutral and unrelated to hostility. The average word length (both character and syllable counts) was not different across word types. A pool of phonetically possible nonwords (e.g., *suzzle*) was generated from a different set of words, by either changing or deleting a letter in one of the syllables or by doing both.

Postexperimental angry mood. Following the second lexical decision task, participants self-rated their angry mood on a scale from 0 (*not at all*) to 3 (*very much*) for the following items: “furious,” “angry,” “spiteful,” and “mad” ($\alpha = .89$; $M = 0.72$, $SD = 0.80$).

Rejection essays. After the mood assessment, participants were asked to write down exactly what they thought and felt while they imagined the rejection experience during the experiment. Ten participants returned their booklets without writing this essay. Two independent judges, blind to the study hypotheses and participants’ experimental conditions, rated the essays for vividness of the description, amount of

Table 1. Experimental stimuli used in the lexical decision task

Hostility words

aggressive, anger, attack, curse, destroy, enraged, fierce, fight, fist, fury, hate, hit, hostile, kick, mad, mutilate, provoke, punch, quarrel, rage, revenge, scream, slap, spite, struggle, temper, vengeance, vicious, violence, wrath

Negative control words

accident, cancer, cockroach, crash, decayed, dirty, disaster, failure, feces, fungus, garbage, gross, infect, insect, itch, nausea, obese, pity, pollute, poverty, puke, putrid, rat, sickness, smog, stale, trash, virus, vomit, wart

Neutral words^a

automobile, bookcase, cab, cement, chalk, curtain, dress, form, lamp, manual, notebook, pavement, room, software, thread

Nonwords

akmow, arsgay, avteal, baxpov, cawteg, cowmint, craffid, dakewelt, dorsar, fokyom, hasone, hunsop, jalfig, jomtike, ligtuid, maigwen, makpak, moufwent, naylim, nulhut, olpand, sekpair, stawus, suzzle, virpest, wimpow, wodince, wongract, yaskog, zurpime

^aThe same neutral word list was used in the first and the second lexical decision tasks.

detail, and degree of anger and hurt (i.e., *hot content*) on a scale from 1 (*not at all*) to 4 (*very much*).

Interjudge agreement was high for all three ratings (all $r_s > .64$, $p_s < .001$). Vividness and detail ratings were highly correlated with each other, $r(261) = .86$, $p < .001$, and they were averaged into a single index of *elaboration* intended to tap into how much effort participants put into imagining the rejection experience ($M = 2.77$, $SD = 0.86$). Although hot content was positively related to this index, $r(261) = .32$, $p < .001$, it was kept as a separate conceptual measure because it assesses anger and hurt, which are directly relevant to our hypotheses ($M = 2.88$, $SD = 0.86$).

Preliminary content analyses revealed that most of the rejection experiences happened with either close friends (30.04%) or romantic partners (23.95%), followed by acquaintances (18.63%), parents (3.8%), and strangers (3.8%). In 19.77% of the cases, the rejecter was undetermined. Experimental condition was unrelated to this breakdown, and the main results reported here did not differ as a function of relationship type.

RSQ. The RSQ (Downey & Feldman, 1996) consists of 18 hypothetical situations in which rejection by a significant other is possible (e.g., “You ask your friend to do you a big favor”). For each situation, people indicate their degree of anxiety about the outcome as well as the perceived likelihood that the other person would respond in a rejecting fashion. For each situation, the expected likelihood of rejection is weighted by the degree of anxiety, and scores across the 18 situations are then averaged (see Downey & Feldman for details on validity and reliability). RSQ scores in this sample ($M = 10.25$, $SD = 3.53$) were not related to participants’ sex or experimental condition ($F_s < 1.10$).

Results

Participants’ sex and RS had neither additive nor interactive effects with the attentional-focus manipulation for any of the dependent mea-

Table 2. *Explicit and implicit measures of hostility as a function of the manipulation of ideation*

Outcome variable	Condition			<i>F</i>	<i>df</i>	<i>d</i>
	Hot focus (<i>n</i> = 85)	Cool focus (<i>n</i> = 88)	Spontaneous focus (<i>n</i> = 100)			
Lexical decision times for hostility words (in milliseconds)	600.82 _a (117.82)	624.75 _b (132.24)	626.76 _b (119.96)	4.26*	2, 267	0.25
Angry mood	0.81 _a (0.90)	0.51 _b (0.68)	0.83 _a (0.76)	4.76**	2, 269	0.27
Hot content in essays	3.25 _a (0.79)	2.57 _b (0.87)	2.83 _c (0.84)	14.23***	2, 260	0.47

Note. For each outcome variable, the table shows the mean values (standard deviations are in parentheses), along with the *F* ratio for the effect of condition, degrees of freedom, and the effect size. Response times to hostility words are adjusted for response times to neutral words. Higher scores indicate more angry mood (scale from 0 to 3) and more hot content (scale from 1 to 4). Means in the same row that do not share subscripts differ at $p < .05$. Degrees of freedom differ for the three outcome variables because data from 5 participants with extreme error rates were not included in the lexical decision time analysis, and 10 participants did not write the rejection essay.

* $p < .05$. ** $p < .01$. *** $p < .001$.

sures. Thus, the analyses we report do not include these variables in the model.¹

Accessibility of hostility in the lexical decision task

Data from 5 people with error rates 4 *SDs* above the mean in the lexical decision task (error rates higher than 22%) were excluded from the response time analyses. Lexical decision times (LDTs) for words with incorrect responses were then deleted (1.91% of all the cases). None of the error rates for the four categories of stimuli were related to experimental condition or RS. The mean LDT across all conditions and stimuli was 701.51 ms ($SD = 148.94$ ms).

The LDTs for hostility words were subjected to a general linear models analysis with attentional-focus manipulation as a categorical between-subjects predictor and the LDTs for neutral words as the covariate. There was a significant effect of experimental condition, which remained significant when LDTs for negative words were also controlled. Subsequent *t* tests showed that hostility was more accessible in the hot-focus condition than in the cool-focus and no-instructions conditions (see Table 2). These results remained unchanged when analyses were conducted on log-transformed reaction times.

Similar analyses conducted for negative control words showed that, controlling for neutral words, the effect of experimental manipulation was not significant ($F < 1.60$). In general, participants responded more slowly to negative words ($M = 633.37$ ms, $SD = 130.70$) than to hostility words ($M = 617.89$ ms, $SD = 123.35$), $t(266) = 4.15$, $p < .001$. These results support our expectation that rejection would specifically prime hostility (e.g., “rage”), rather than negative but irrelevant thoughts (e.g., “infect”).

1. The Beck Depression Inventory (BDI; Beck, Ward, Mendelsohn, Mock, & Erbaugh, 1961) was one of the measures administered during the questionnaire session. Because depression and aggression show high comorbidity, we conducted analyses to explore the impact of depression on hostile reactivity to rejection. The effect of experimental condition remained significant for all three hostility indices in analyses controlling for BDI scores. Furthermore, although there was a trend for depression to be positively related to both angry mood and hot content in essays across experimental conditions, the former relationship was strongest in the hot-focus condition and the latter in the no-instructions condition.

Self-reported angry mood

Angry mood also varied significantly as a function of experimental manipulation (see Table 2). Specifically, anger was lower in the cool-focus than in the hot-focus and no-instructions conditions. As hypothesized, levels of angry mood were similar in the latter two conditions.

Hot content in rejection essays

Similarly, the effect of the experimental manipulation was significant for hot content of the essays. As Table 2 shows, rejection essays contained higher levels of anger and hurt in the hot-focus condition than in the other two conditions. Furthermore, people’s essays expressed less anger and hurt in the cool-focus than in the no-instructions condition. Together, these results show that whereas hot focus accentuated emotional reactivity, cool focus attenuated it.

Controlling for elaboration ratings did not change the results for the essays. The elaboration (detail and vividness) ratings themselves were not affected by experimental condition ($F < 1$). This is not surprising because the hot- and cool-focus instructions were intended to manipulate the kind of information people focused on, rather than the amount or the detail of information recalled per se.

Relationship among implicit and explicit measures

Angry mood was positively but weakly related to the hot content of the rejection essays ($r = .12$, $p < .06$). This relatively weak relationship may partly reflect the fact that hot content in the essays was assessed by independent raters, whereas angry mood was self-reported. LDTs to hostility words were weakly but significantly correlated with only hot-content ratings of the rejection essays ($r = -.16$, $p < .02$; for angry mood, $r = -.05$, n.s.). This relationship did not differ significantly by experimental condition ($t < 1$; hot focus: $r = -.08$, n.s.; cool focus: $r = -.20$, $p < .08$; no instructions: $r = -.16$, n.s.). Given prior results (Greenwald & Farnham, 2000), such a weak relationship between explicit and implicit measures is unsurprising.

DISCUSSION

The present research supports the hypothesis that whereas an emotional, hot attentional focus leads to heightened anger and hostility in

response to perceived rejection, the use of cooling strategies such as distancing and distraction from the emotion-arousing aspects of rejection may attenuate hostile reactivity. Specifically, hostility was less accessible to participants when they thought about the rejection experience in terms of the physical setting in which it happened than when they thought about it in terms of their physiological and emotional reactions. Similarly, people who had a cool focus had lower levels of angry mood and negative affect in their descriptions of the rejection experience than people with a hot focus.

Because participants were asked to recall a highly rejecting experience, we had expected that the no-instructions (control) condition would spontaneously lead to hot focus, thus eliciting hostility to a similar degree as the experimentally primed hot-focus condition. This expectation was supported for the mood and hot-content indices, for which cool focus reduced hostility compared with both the hot-focus and the no-instructions conditions. In the lexical decision task, however, the accessibility of hostility was similar in the control and cool-focus conditions, and lower in these conditions than in the hot-focus condition. Together, these results suggest that both augmentation of hostility under hot focus and attenuation of hostility under cool focus are likely to play a role in pulling the intensity of hostile reactions to rejection in opposite directions.

It is possible that a defensive suppression process might have also contributed to the relatively low accessibility of hostility in the no-instructions condition in the lexical decision task. Research shows that such suppression is elicited particularly when threat cues are primed explicitly and consciously (e.g., Greenberg, Pyszczynski, Solomon, Simon, & Breus, 1994), as when rejection was primed by recall of hurtful memories in our experiment. Because participants in the control group were merely asked to think about this recalled experience and not given any specific attentional-focus instructions, they may have had more resources to suppress or avoid such threatening, unpleasant thoughts than participants who were given specific instructions to follow. The literature also indicates that the effect of defensive suppression weakens after a time delay or a distraction task (Greenberg et al., 1994), and that ironically inhibited thoughts rebound once suppression is released (Wegner, 1994). This account is consistent with our finding that hostility in the no-instructions condition was relatively low and similar to hostility in the cool-focus condition in the lexical decision task that immediately followed the experimental manipulation, but was relatively high—similar to the level of hostility in the hot-focus condition—in the subsequent mood and essay indices.

It is also important to note that thought suppression and cool focus are conceptually different mechanisms. In pure thought suppression, one simply tries to avoid unwanted thoughts without an effective, specific distraction strategy, which paradoxically leads to later increases in the accessibility of suppressed thoughts (Wegner, 1994). Cool attentional focus, in contrast, involves actively engaging attention in non-rejection-related, distracting and distancing information, and such focused distraction is less likely to make individuals vulnerable to the rebound effect that is typically elicited by unfocused distraction in thought suppression (Wegner, Schneider, Carter, & White, 1987). The consistently low level of hostility in the cool-focus condition across three dependent measures supports this account.

Overall, the findings presented underscore the role of attention in self-regulation and demonstrate the value of making accessible a set of theory-based control strategies for cooling hostile responses that otherwise tend to be elicited by rejection experiences. Given that attentional control strategies are experimentally modifiable, it now seems

important to pursue the question of whether cooling strategies can be taught to empower individuals, especially those who are particularly vulnerable, and enhance their resilience.

Acknowledgments—This research was supported by grants from the National Institute of Mental Health (MH39349, MH51113), the Harry Frank Guggenheim Foundation, and the James S. McDonnell Foundation and was part of the first author's Ph.D. dissertation thesis at Columbia University. We thank Janet Metcalfe for her important help in designing the study, and Sheri Levy, Rodolfo Mendoza-Denton, Jasia Pietrzak, Yuichi Shoda, and anonymous reviewers for their valuable comments on an earlier version of the manuscript.

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(RECEIVED 6/12/01; REVISION ACCEPTED 11/20/01)