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Responding to negativity: How a risky tactic can serve a vigilant strategy

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Abstract

Regulatory focus theory distinguishes between two motivational systems—a promotion system concerned with nurturance and advancement and a prevention system concerned with security and safety [Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist, 52*, 1280–1300]. In signal detection terms, a preference for eager strategies within the promotion system has been equated with a ''risky'' bias, whereas a preference for vigilant strategies within the prevention system has been equated with a ''conservative'' bias. However, we propose that when prevention-focused individuals face negative input, they should be willing to incur false alarms to ensure that negative stimuli are correctly identified. Across six studies, we found for negative stimuli a reversal of the traditional finding that prevention participants show a conservative bias in information processing. In these studies, prevention participants consistently exhibited a risky bias when the input was negative. We suggest that this new tactic—a risky bias in response to negativity—best serves the prevention strategy of vigilance.

Keywords: Self-regulation; Motivation; Regulatory focus; Negativity; Vigilance; Signal detection

Behavior regulation allows pursuit of goal-directed activities across changing situations, and the ability to respond flexibly in differing contexts is a hallmark of effective self-regulation (e.g., Cantor & Kihlstrom, 1987; Chiu, Hong, Mischel, & Shoda, 1995; Karoly, 1993). In adopting the appropriate response for a given situation, individuals are often confronted with uncertainty regarding ambiguous or vague stimuli. Is that a spelling error or not? Is that man in the alley a harmless passer-by or a dangerous criminal? Is that mole benign or potentially cancerous? While individuals face uncertainty across a range of situations, one important contextual variable that may differentiate these situations regards the valence of input available in the environment. Although many environments are neutral or positive, others expose individuals to negative input that must be addressed through self-regulatory processes. How might self-regulatory responses change in response to shifting valence?

In the clinical, stress, and coping literatures, numerous studies have examined how individuals, particularly those with anxiety disorders, respond to negative stimuli (e.g., Krohne, 1993). Many studies provide evidence of an initial attentional bias toward threatening stimuli (e.g., Bradley, Mogg, White, Groom, & de Bono, 1999) or increased difficulty disengaging attention from threatening stimuli (Fox, Russo, Bowles, & Dutton, 2001). Similar biases favoring attention to negative input have been demonstrated in general populations, such that negative stimuli appear to be particularly influential for judgments and learning (Öhman, Flykt, & Esteves, 2001; for reviews, see Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Rozin & Royzman, 2001). This negativity bias may reflect an evolutionarily adaptive response toward the automatic detection of threat (Öhman & Mineka, 2001; Pratto & John, 1991) and constitutes one manifestation of vigilance, a state

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of heightened attention marked by a readiness to act (Berger & Posner, 2000).

In contrast to theories of vigilance or to those that have examined general negativity biases, models of self-regulation have discussed negative valence primarily as an *internal* signal indicating the ineffectiveness of self-regulation (i.e., as a sign of poor progress) with regard to desired or undesired end-states (Bandura & Cervone, 1983; Carver & Scheier, 1981; Heckhausen & Gollwitzer, 1987; Higgins, 1997). Negative valence has typically been characterized in these models as an internal emotional state resulting from goal monitoring. Less attention has been paid to the influence of external signals of negativity on self-regulatory processes.

Regulatory focus theory

One model of self-regulation that has attempted to characterize behavioral tendencies under vigilance is regulatory focus theory (Higgins, 1997). Regulatory focus theory posits the co-existence of two regulatory systems—the promotion and prevention systems—that serve fundamentally important but different survival needs. The relative dominance of either state (both as a measured and manipulated variable) has been shown to affect diverse phenomena involved in social judgment and behavior (e.g., Crowe & Higgins, 1997; Friedman & Förster, 2001; Higgins, Roney, Crowe, & Hymes, 1994; Liberman, Idson, Camacho, & Higgins, 1999).

Within this theory, vigilance is viewed as a critical process within the prevention, but not the promotion, system. Whereas the promotion system is concerned with nurturance needs (i.e., needs related to ideals, advancement, and accomplishment) and is marked by a strategic preference for eagerness means, the prevention system involves needs related to duties, obligations, and security concerns and is marked by a strategic preference for vigilant means. The prevention system is characterized by sensitivity to the absence or presence of negative outcomes, and, consequently, an individual in a prevention state is motivated to avoid matches to undesired end-states. Within this framework, vigilant strategies allow an individual in a prevention state to guard effectively against loss.

What tactics are used to ensure loss avoidance? In its current form, regulatory focus theory suggests that individuals in a state of vigilance should be motivated "to attain correct rejections and to avoid errors of commission or false alarms (i.e., making a mistake)" (Higgins, 1997, p. 1285). In signal detection terms (Tanner & Swets, 1954), a prevention focus should engender a "conservative bias," the setting of a very strict criterion for acceptance. A conservative bias results in few false alarms and reflects the psychological state of "playing it safe," characterized by thoroughness, attentiveness, and erring on the side of caution. This strategic tendency stands in stark contrast to the means that should be exhibited by individuals under a promotion focus. Because these latter individuals are motivated to realize gains and advancement, they should adopt a lenient criterion for acceptance, being open and inclusive even at the risk of increased false alarms. Given their preference for eager strategies, promotion individuals should therefore exhibit a "risky" or "liberal" bias, a willingness to ensure hits and avoid misses.[1]

Clearest support for these differing means comes from two studies that utilized a recognition memory paradigm (Crowe & Higgins, 1997, Study 2; Friedman & Förster, 2001, Study 3). In these studies, individuals were presented with non-words (Crowe & Higgins, 1997) or neutral words (Friedman & Förster, 2001), then later asked to distinguish these original "old" stimuli (the signal) from "new" distractor stimuli that had not been presented originally (the noise). This paradigm is particularly useful for studying strategic means, since, through use of signal detection methods, it easily allows separate identification of both sensitivity (i.e., the accuracy of memory controlling for retrieval) and bias (i.e., the tendency under uncertainty to guess that stimuli are "old"—a "risky" bias—or "new"—a "conservative" bias). In both studies, individuals in a prevention focus showed a more "conservative" bias, a tendency under uncertainty to err on the side of caution.

Shifting valence, shifting tactics

Despite these demonstrated differences in responding to neutral stimuli, a conservative bias might be suboptimal for addressing prevention-related concerns in some circumstances (cf. Liberman et al., 1999). Specifically, we asked whether there might be conditions under which a *risky* tactic (adopting a more lenient criterion for acceptance) might be a more effective means for serving the goal of preserving safety and security. We suggest that one such condition exists when prevention-focused individuals face negative input. Why would individuals under a prevention focus change their typical tactics in response to negativity? Since the prevention system is fundamentally concerned with the absence or presence of negative outcomes, an individual operating under this system should be especially focused on negativity in the environment. Some negative stimuli (e.g., a snake) present an obvious threat to safety and security and should be of great concern to an individual in a prevention state. However, even stimuli that simply denote, describe, or are associated with negativity or threat have been shown to automatically activate the referential meaning (Higgins & Rholes, 1976) and negative evaluations associated with that

[1] We adopt the labels "conservative" versus "risky" bias throughout our paper given that these labels were used in the research on which we most directly build (Crowe & Higgins, 1997). However, there a number of ways that researchers have characterized these response biases. In particular, a "risky" bias, or the setting of a lenient response criterion that increases the chances of false alarms, has also commonly been identified as a "liberal" bias. See Swets (1973) for additional discussion of the ways that the terms "conservative" versus "liberal" or "risky" have been used.

referent (Fazio, 2001). Consequently, although a person who sees the word "snake" might be exposed to no actual risk or danger, participants can experience the stimulus as negative or a threat to be avoided (see De Houwer, Crombez, Baeyens, & Hermans, 2001; Fazio, 2001). Thus, to the degree that a negative stimulus may suggest a challenge to the primary concern of an individual under prevention focus—maintaining safety and security—prevention-focused individuals might be especially motivated not to "miss" negative input. When negative input is involved, individuals in a prevention focus might modify their typical tactics (i.e., the conservative tactic of attaining correct rejections while minimizing false alarms) and show a willingness to incur false alarms to ensure that negative stimuli are detected (i.e., a risky tactic).

Therefore, in contrast to current conceptualizations of regulatory focus theory, we propose that strategic concerns and the tactical means used to address those concerns are theoretically and empirically separable. In doing so, we distinguish between *strategies* (e.g., eagerness, vigilance) and *tactics* (e.g., risky vs. conservative bias) that serve to actualize a contextualized strategy. Strategies direct behavior generally but do not suggest the specific instantiation of behavior, whereas tactics reflect the specific ways in which a strategy is enacted in a particular context. This distinction implies that a given strategy (being vigilant) may be served by different tactics given different situations, and we suggest that different tactics will be used for negative compared with positive input when individuals are in a prevention focus.[2] The previously demonstrated use of conservative tactics toward neutral stimuli under typical circumstances might best serve the prevention system by minimizing mistakes that can undermine the focus of maintaining safety and security (i.e., false alarms). However, when encountering negativity, vigilance should mean doing *whatever is necessary* to maintain safety, and false alarms should be tolerated given the concern to avoid misses of negative input.

Present research

The current studies tested this prediction regarding responses to negativity under a prevention focus. To do so, we employed the signal detection recognition memory paradigm described above but used stimuli that varied in valence. Including both positive words (e.g., party) and negative words (e.g., cancer) allows identification of risky versus conservative tactics in response to input that differs in valence, uncontaminated by differences in accuracy. Use of signal detection methods also allows calculation of a bias estimate in each condition that can be compared against a meaningful baseline (i.e., a score of 0 indicating random responding under uncertainty). In contrast to previous work showing that individuals in a prevention focus adopt a strict criterion for acceptance (a conservative bias) for neutral stimuli, we predicted that individuals in a prevention focus would adopt a lenient criterion for acceptance (a risky bias) for negative stimuli.[3]

We further predicted that this risky bias toward negative stimuli would be greater for individuals in a prevention than in a promotion focus. Previous work has demonstrated that individuals automatically orient to negative or threatening stimuli (Öhman, 2002; Smith, Cacioppo, Larsen, & Chartrand, 2003), are more affected in terms of information processing by negative than positive stimuli (Baumeister et al., 2001), and judge negative stimuli more extremely than equally extreme positive stimuli (e.g., Ito, Cacioppo, & Lang, 1998). Thus, we predicted that participants should adopt a more lenient criterion for acceptance of negative stimuli because the inherent cost of missing negative signals is greater than the inherent cost of missing positive signals (e.g., Öhman & Mineka, 2001). In addition, we predicted that this tendency would be amplified for individuals in a prevention focus given their greater concerns with the costs of missing negative input.

Given that evidence in support of our predictions would have important implications for the tactical nature of prevention-focused vigilance within regulatory focus theory (Higgins, 1997), we attempted to assess the reliability of the obtained effect across multiple conditions that reflect both exact and conceptual replications. Across six studies, we tested whether the effects were due to an impact of regulatory focus at encoding versus retrieval (by varying the nature and timing of the manipulation of regulatory focus before encoding or before recognition) (cf. Friedman & Förster, 2001), whether increased cognitive demands would alter or exacerbate the effect (by varying the presentation speed of the stimuli) (e.g., Sherman, Lee, Bessenoff, & Frost, 1998), and whether the effects depended on the context in which negative input was presented (by manipulating valence within- versus between-participants) (e.g., Cacioppo, Crites, Gardner, & Berntson, 1994). To provide the most complete, reliable, and conservative representation of our findings, we report results both for each study separately and collapsed across studies.

Experiments 1–6

Method

The standard procedure for each study is described below. Variations and specific *N*s for each study are detailed in Table 1.

[2] Although we believe that individuals may shift the tactics they employ to serve a given strategy, we do not mean to imply that such shifts require awareness or control. Individuals *may* be able to control tactical shifts in some cases, but we do not see this as a necessary condition.

[3] We conducted a pilot study to ensure that we could replicate the typical pattern with our procedures. Participants completed a manipulation of regulatory focus, were presented words neutral in valence (e.g., cat, house, comb), and, after a delay, completed a recognition memory task. Consistent with previous studies, promotion participants were riskier than prevention participants toward these neutral stimuli. Complete details are available from the second author.

Table 1
Summary of Study Designs for Generalized Estimated Equations Analyses

Study	N	# of obs. contributed to model	Presentation Speed	Regulatory Focus (RF) Manipulation	Type of RF manipulation	Valence
1	95	190	5 s	before encoding	Change essay	Within-Ss
2	69	138	5 s	before encoding	Change essay	Within-Ss
3	43	86	5 s	before recognition	Change essay	Within-Ss
4	103	103	3 s	before recognition	Current goals essay, maze	Between-Ss
5	96	96	1 s	before recognition	Current goals essay, maze	Between-Ss
6	96	96	3 s	before recognition	Change essay, maze	Between-Ss

Participants and design

A total of 502 participants received either course credit or were paid for their participation. Across studies, participants were randomly assigned to condition in a 2 (regulatory focus: promotion vs. prevention) × 2 (valence: positive vs. negative) design. Whereas regulatory focus was always manipulated between-participants, valence was manipulated within-participants in Studies 1–3 and between-participants in Studies 4–6.

Procedure and materials

Participants were told they would be participating in several unrelated studies. They were asked to view words on a computer screen and were told that they later would be given a memory test. Participants viewed each word on a computer screen, one at a time in random order. The complete set included 84 negative or 84 positive words. Although the majority of the words were selected to be unrelated to regulatory focus (e.g., clown, friend, decay, vomit), one-third of the words were selected to vary in their relevance to promotion (e.g., achieve, unfulfilled) and prevention (e.g., peace, anxiety) to control for the equal distribution of system-relevant words within valence and to rule out the possibility that effects would be dependent on system-relevance. Each participant initially viewed a unique set of half of the stimuli, and the remaining words served as foils in the later recognition memory task. One of the benefits of this type of randomization is that words from the stimulus set could appear either as targets or foils, decreasing the likelihood that effects are due to any specific stimulus array.

Ratings by 16 pilot participants on a nine-point scale from −4 (extremely negative) to +4 (extremely positive) confirmed that the negative words were indeed more negative ($M = -2.54$) than the positive words ($M = 2.14$), $t(15) = 15.63$, $p < .001$. Additionally, 12 graduate students familiar with regulatory focus theory rated all of the words, in terms of their relevance to the two systems, on a scale ranging from −4 (extremely prevention) to +4 (extremely promotion). Prevention words were rated as more prevention ($M = -1.36$) and promotion words were rated as more promotion ($M = .86$), $t(11) = 5.23$, $p < .001$. We also controlled for the length and frequency of words between stimulus sets. Valence × relevance ANOVAs of word length (i.e., number of letters) and frequency (based on norms from Francis & Kucera, 1982) produced no significant effects.

Participants completed a series of distractor tasks prior to completing the recognition memory task. In this task, they were asked to indicate whether each word was "old" (one seen in the initial set) or "new" (one not seen before). After the memory test, some participants (Studies 4–6) completed a mood measure, the state PANAS (Watson, Clark, & Tellegen, 1988). All participants were then fully debriefed, compensated, and thanked.

Regulatory focus manipulation

Regulatory focus was manipulated either before viewing the initial word set (Studies 1–2) or before the memory task (Studies 3–6) using one of two standard manipulations of regulatory focus (Freitas & Higgins, 2002; Higgins et al., 1994). The manipulation involved participants writing a short essay describing either how their hopes and aspirations (promotion manipulation) or duties and obligations (prevention manipulation) had changed since childhood (Studies 1–3 and 6) or to write about a current hope or aspiration or a current duty or obligation (Studies 4–5). Five minutes were provided for completion of the essay. Prior to the essay task in Studies 4–6, participants also completed a maze task designed to strengthen the induction of either a promotion or prevention state (Friedman & Förster, 2001). In both versions of the maze, participants are instructed to find a way for a mouse to exit the maze. In the promotion condition, a piece of cheese marks the end of the maze (achieving a desired end-state), whereas in the prevention condition, an owl hovers over the mouse and a door marks the end (successfully avoiding an undesired end-state) (Friedman & Förster, 2001). After completing the maze, participants then wrote an essay intended to induce the same regulatory state as the maze task.

Results

Calculation of measures of accuracy and bias

The proportion of hits (correct identification of old items) and false alarms (failure to reject new items) from

the recognition memory task were used to compute non-parametric measures of recognition accuracy, A' (Grier, 1971), and bias, B''_D (Donaldson, 1992), for both positive and negative words.[4] These indices reflect the degree that each participant correctly discriminated correct old items from new foil items (A') and showed a risky or conservative response bias under uncertainty (B''_D) in each category. Higher A' scores show greater sensitivity, and B''_D scores range from −1 (risky bias) to 1 (conservative bias), with 0 indicating the absence of systematic bias (i.e., random responding).

All models were estimated using the GENMOD procedure in SAS (SAS Institute, 1997) using a generalized estimating equations (GEE) model (Diggle, Liang, & Zeger, 2002). This procedure is akin to an ANOVA model that treats study as a factor but also adjusts for the non-independence of observations in Studies 1–3, where valence was manipulated within-participant. To estimate and adjust for non-independence, GEE models allow correlated within-person residuals. This approach is a form of meta-analysis, but, unlike conventional procedures based on summary data, utilizes the complete data from each study. Because GEE models are based on large-sample statistical theory, they provide tests of significance based on Z and χ^2 rather than t and F (Diggle et al., 2002). All tests were two-tailed.

Before focusing on main hypotheses, models examining the effect of study were first considered. Models excluding study as a variable did not significantly change fit (elimination of 3-way interaction: change in $\chi^2_{(5)} = .28$, ns; elimination of both 2-ways interactions involving study: change in $\chi^2_{(5)} = .16$, ns, change in $\chi^2_{(5)} = 1.14$, ns). Thus, these interactions were excluded in the models reported below.

Accuracy

An exploratory analysis of the accuracy measure, A', produced a significant effect of valence, $\chi^2_{(1)} = 11.72$, $p < .001$, showing that sensitivity was lower for negative ($M = .82$, 95% confidence interval (CI) = .82, .84) than for positive words ($M = .84$, CI = .83, .85) (see Fig. 1). This provides a conceptual replication of earlier findings (Mogg, Mathews, & Weinman, 1989) but with a non-clinical sample. There was also a significant effect of study, $\chi^2_{(1)} = 26.07$, $p < .001$, due to significantly lower sensitivity in Study 5 when presentation speed was 1 s. No other results were significant.

[4] We excluded any participant whose false alarm rate was greater than their hit rate for any category of word-relevance. Applying this criterion led to the exclusion of data from 37 participants (7% of the sample) but did not change the pattern of results. For remaining data, corrections for extreme memory performance (when False Alarms = 0% or Hits = 100%) were employed to allow calculations of B''_D (Banaji & Greenwald, 1995).

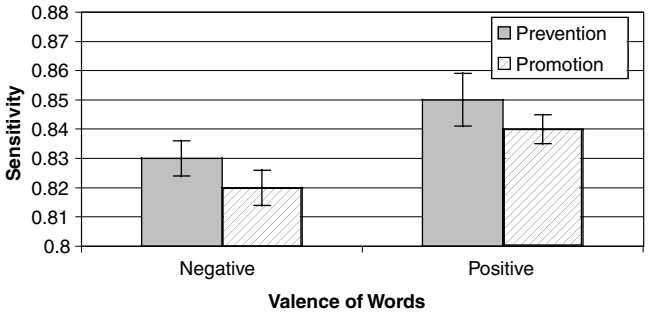

Fig. 1. Effect of regulatory focus and valence on response sensitivity (A'). Error bars show 2 standard errors.

Bias

Before conducting meta-analyses, the specific predictions regarding bias were tested in each study (see Table 2). A risky bias toward negative stimuli (B''_D significantly different from 0) was exhibited by prevention-focused participants in five of six studies. The only exception was Study 5 when presentation speed was only 1 s ($B''_D = -.15$, $p = .13$). The relevance variable resulted in no significant effects in any of the studies, providing evidence that the risky bias of prevention-focused participants toward negative stimuli is not restricted only to negative words related to the prevention system. Given the null results, this variable is not discussed further in our analyses.

The meta-analysis revealed a significant main effect of valence, $\chi^2_{(1)} = 88.61$, $p < .001$, such that participants showed a riskier bias for negative ($M = -.13$, CI = −.18, −.09) versus positive words ($M = .12$, CI = .08, .16), and a marginally significant main effect of regulatory focus, $\chi^2_{(1)} = 2.89$, $p = .09$. Prevention participants tended to be more risky ($M = -.03$, CI = −.09, .01) than promotion participants ($M = .02$, CI = −.03, .08). These main effects were qualified by a marginal interaction between regulatory focus and valence, $\chi^2_{(1)} = 2.42$, $p < .12$. To understand the nature of this interaction, we examined the contrasts between prevention-focused and promotion-focused participants within negative versus positive words. The critical contrast comparing prevention- versus promotion-focused participants within negative words was significant,

Table 2
Means (and SDs) for bias (B''_D) from individual studies

STUDY	Prevention		Promotion	
	Negative	Positive	Negative	Positive
1	−.17* (.40)	+.10 (.41)	−.01 (.44)	+.23* (.38)
2	−.23* (.41)	−.05 (.38)	.00 (.44)	+.21* (.41)
3	−.26* (.51)	+.15 (.39)	−.06 (.42)	+.10 (.34)
4	−.20* (.37)	+.12 (.44)	−.15 (.42)	+.11 (.49)
5	−.15 (.44)	+.24* (.34)	−.03 (.53)	+.17 (.38)
6	−.28* (.43)	+.13 (.39)	−.15 (.51)	+.01 (.48)

Note: Data were excluded for any participant whose false alarms exceeded hits within valence.
* $p < .05$.

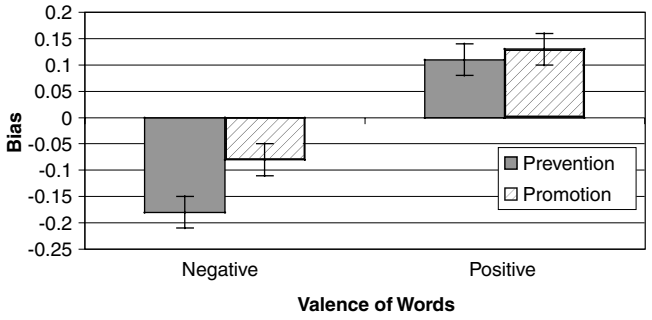

Fig. 2. Effect of regulatory focus and valence on response bias (B''_D). Error bars show 2 standard errors.

$\chi^2_{(1)} = 4.98$, $p = .03$, such that the mean difference in bias scores between prevention-focused and promotion-focused participants was −.10 units (CI = −.18, −.01), corresponding to a standardized small effect size of $d = .23$ (Cohen, 1988). As predicted, prevention-focused participants showed a riskier bias for negative stimuli ($M = -.18$, $CI = -.24, -.12$) than did promotion-focused participants ($M = -.08$, CI = −.15, −.02). The equivalent analysis for positive stimuli produced no significant difference.

Further, as can be seen in Fig. 2, prevention-focused participants' B''_D scores for negative words were significantly different from zero, $\chi^2_{(1)} = 35.17$, $p < .0001$. While promotion participants' B''_D scores were also significantly different from zero, $\chi^2_{(1)} = 6.84$, $p = .009$, the effect was not as strong, and, as reported above, promotion-focused participants were less risky than prevention participants. For positive stimuli, both prevention ($M = .11$, CI = .05, .17, $\chi^2_{(1)} = 13.40$, ($p < .001$) and promotion ($M = .13$, CI = .07, .09, $\chi^2_{(1)} = 19.79$, ($p < .001$) participants showed a conservative bias significantly different from baseline.

The collection of PANAS data in Studies 4–6 also allowed us to address the viability of an alternate interpretation based on mood. If the prevention manipulation induced a negative mood state, this might account for the more lenient criterion for negative input. To examine this possibility, data from the PANAS for Studies 4–6 were analyzed using ANOVA procedures with regulatory focus as the independent variable. Analyses of the data from the 314 participants who completed the 10-item positive (PA; Cronbach's $\alpha = .86$) and negative (NA; Cronbach's $\alpha = .84$) subscales produced no significant effects (both Fs <1). Since mood states did not vary by condition, this suggests that mood did not mediate the relation between regulatory focus and tactical preferences. However, given that mood was assessed only once, at the completion of the study, we cannot entirely rule out the possibility that mood was unaffected by the manipulation. Future work will need to be done to more directly test this assertion.

General discussion

Regulatory focus theory differentiates between two motivational orientations—a promotion focus with a preference for eager strategies and a prevention focus with a preference for vigilant strategies (Higgins, 1997). Although these strategies have previously been equated with tactical preferences (risky vs. conservative biases, respectively), we found that these tactical preferences can vary as a function of signal valence. Specifically, we found that prevention-focused participants show a risky bias in signal detection terms toward negative stimuli, a reversal of the traditional finding (Crowe & Higgins, 1997; Friedman & Förster, 2001). Across five of six studies, individuals in a prevention focus showed a significantly riskier bias for negative words than individuals in a promotion focus. Although this effect was modest in size, a meta-analysis confirmed the reliability of this effect across all studies.

We suggest that this new tactic—a risky bias in response to negativity—best serves the prevention strategy of vigilance. Prevention-focused participants, concerned with security and safety, must guard against negative input. Because negativity poses a particular threat to the prevention system, guarding against errors of omission becomes a paramount concern. The motivational system of promotion-focused participants, on the other hand, is less sensitive to negative input. Although promotion-focused participants did show a risky bias with negative words, they were not as risky as prevention-focused participants.[5]

Some might wonder if the risky bias of prevention-focused participants reflects stable differences in the greater accessibility of negative information in memory, rather than a change in criterion regarding negativity detection. While this would be a viable possibility if we had measured the chronic regulatory focus of participants, in all of the present studies regulatory focus was experimentally manipulated. Thus, despite the possibility that chronic individual differences might also contribute to response biases (creating variability within each experimental condition), we still found a strong state effect of manipulated regulatory focus in every study. Furthermore, prior research has established that individuals in a prevention focus do *not* show any greater accessibility for negativity in general relative to individuals in a promotion focus (Shah & Higgins, 2001). Therefore, differences in chronic or temporary accessibility cannot easily account for this pattern of findings.

Although our primary focus was on participants' tactical response to negative words, it is also interesting to consider the effects observed in response to positive input. Prevention-focused participants showed a conservative bias for positive words, and this effect is consistent with previous studies. However, promotion-focused participants also were conservative toward positive words, and this response differs from the typical risky pattern shown by individuals

[5] While some have proposed that increased rates of false recognition to negative versus neutral words are due to the higher levels of semantic cohesion for emotionally valenced words (e.g., Maratos, Allan, & Rugg, 2000), this explanation would not account for the difference we found between the experimentally manipulated prevention and promotion conditions for negative words.

in a promotion focus. It is important to note, however, that previous studies have all used *neutral* stimuli; until now no studies examined responses to valenced stimuli. Why did promotion-focused individuals tend to show a conservative bias toward positive input? Although speculative at this point, we suggest that when the context is extremely positive (e.g., words such as triumph, peace), there may be little perceived room for additional advancement and gain. In such a context, even promotion-focused participants may prefer a conservative tactic (e.g., perhaps for reasons similar to what produces risk aversion when gains increase; Kahneman & Tversky, 1979). In future research, we intend to explore the possibility of a tactical shift of promotion-focused individuals with extremely positive stimuli, which could provide another example of the independence of strategic and tactical levels in self-regulation.

In sum, these findings suggest an important expansion of regulatory focus theory with respect to the behavioral implications of prevention-focused vigilance (Higgins, 1997). One of the original contributions of regulatory focus theory was that it introduced a critical distinction between the independence of the "system" level of self-regulation (i.e., whether individuals were approaching desired end-states or avoiding undesired end-states) and the strategic level of self-regulation (i.e., whether individuals were approaching those desired end-states (or avoiding those undesired end-states) using either eager or vigilant strategies). However, those strategic preferences came to characterize the systems more broadly, such that the strategic differences were equated with tactical differences. The present research makes clear that we must also differentiate between the strategic and tactical levels of self-regulation. In other words, while vigilance characterizes a prevention focus, vigilance can be served either by conservative or risky tactics.

These findings also have significant implications more broadly for models of self-regulation and motivation. As others have noted (see also Cantor & Kihlstrom, 1987), strategies and tactics in self-regulation can and should be distinguished, given that a variety of tactics may be enacted to pursue a given strategy. In predicting the tactical means by which a specific motivational strategy will be pursued, the costs and benefits of various tactics need to be assessed within a given context. The present work suggests that an individual operating within the prevention system is particularly concerned about the costs of missing a negative signal and pursues tactics to ensure against this kind of error.

This tactical preference for riskiness toward negative signals is consistent with prior theorizing about the asymmetric costs of different types of errors. In any judgment under uncertainty, both errors of commission (false alarms) and errors of omission (misses) are possible. Despite the fact that it is impossible to simultaneously minimize both types of errors, the costs of each type of error are not symmetric across decisions and domains (Green & Swets, 1966). This suggests that systems or individuals should be biased toward making the type of error that is least costly. As more recently outlined in error management theory, decision-making systems may consequently have evolved to result in adaptive biases (i.e., biased toward committing the least costly error) (Haselton & Buss, 2000). For negative or threatening signals in general, missed detection of a negative signal is generally more costly than a false alarm (Baumeister et al., 2001; Rozin & Royzman, 2001). While we do find support for this main effect, it does not obscure the interaction in which we were interested. As the current studies demonstrate, for individuals in a prevention focus, a risky bias toward negative stimuli is *especially* amplified.

One might argue that the recognition memory signal detection paradigm we used is limited both in terms of the nature of the negativity (there were no direct costs for participants nor was safety and security immediately threatened) and the definition of risk (the greater acceptance of false alarms, while "risky" in a signal detection sense, does not necessarily represent risky behavior in other contexts). We recognize these limitations and acknowledge that participants were never exposed to direct threat nor did they exhibit responses involving risk. However, it is intriguing that mere verbal stimuli suggesting negativity led prevention-focused participants to change their typical information processing tactics, and that these tactics appear designed to guard against missing negative signals in the environment even while increasing the likelihood of false alarms. The use of other experimental paradigms involving more direct threats and responses involving risk will help clarify the conditions under which prevention-focused individuals shift their typical tactics in response to negativity.

The adoption of these paradigms is also likely to elucidate other potentially significant implications of the current findings. For instance, while a risky bias might benefit a prevention-focused individual by insuring detection of negative signals, this tactic applied to more ambiguous stimuli or in more muddled contexts might produce numerous undesirable consequences. When an individual is motivated to protect against threat, a risky tactical approach might lead a perceiver to miscategorize even innocuous stimuli as threatening, even if there is only some small suspicion of danger. One might believe, based on stereotypes, for example, that an innocent airplane passenger from the Middle East could be a terrorist, that a young man encountered at night might be a thug, or that a tool in a suspect's hand is a gun. It would also be instructive in future research to explore whether prevention-focused participants would be likely to demonstrate responses involving actual risk in other decision-making domains. For example, a prevention focus might lead individuals to endorse, condone, or tolerate another person's actions that they typically would not find acceptable when those actions are done in the guise of maintaining safety and security. If so, this could suggest that the consequences of risky tactics employed in the service of vigilance extend far beyond the domain of self-regulation to affect numerous phenomena of interest to psychologists and others.

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