Meta-Cognitive Regulation as a Reaction to the Uncertainty of Stereotype Threat

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The use of standardized tests to evaluate and select prospective college students was initially intended to create a merit-based system that would allow talented but less privileged students to gain greater access to selective universities (Bowen, Bok, & Louey, 2000). Given this original intent, it is ironic that these same tests have often revealed group differences in performance that reinforce stereotypic perceptions about the types of groups who are most qualified for admission to these institutions. For example, despite various social and economic programs designed to neutralize the influence of past inequities, African American and Latino high school students consistently underperform (compared to Whites and Asians) on college entrance exams like the Scholastic Assessment Test (e.g., Both, Bovier, Bobko, Switzer, & Tyler, 2001) and the General Record Exam (GRE; Whitworth & Barrientos, 1980). Women also tend to underperform compared to men on the mathematical portion of these types of tests (e.g., National Center for Education Statistics, 1997).

Because these gaps in performance have seemed resistant to efforts to increase educational opportunities for minorities and women, cultural stereotypes about group differences in intellectual ability linger (e.g., Fiske, Cuddy, Glick, & Xu, 2002). Steele and his colleagues (Steele, 1997; Steele & Aronson, 1995; Steele, Spencer, & Aronson, 2002) have proposed that the mere awareness of these negative intellectual stereotypes can place members of stigmatized groups under additional pressure when they find themselves in a situation where their performance or behavior could be interpreted as evidence for the validity of that stereotype. As a result, the apprehension about possibly confirming the stereotype can disrupt the individual’s performance and produce a stereotype-consistent outcome. Steele termed this experience stereotype threat and argued that the additional concern with confirming a negative stereotype is a situation-specific experience that depends only on knowledge of the stereotype and not the belief that it is true.

Research on this important theory has proliferated in the last decade. However, it is only recently that we have begun to understand the mechanisms by which situations of stereotype threat have the power to disrupt performance on cognitive tasks, such as high-stakes standardized tests. The specific goal of this chapter is to examine the degree to which performance is impaired in situations of stereotype threat as a result of meta-cognitive processes designed to reduce uncertainty cued by the activation of a negative self-relevant stereotype. In examining the role of uncertainty we draw from a stress and coping model that we have recently developed to explicate the processes underlying stereotype
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Stereotype Threat

Toni Schmader

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Threat effects on cognitive performance (Schmader, Johns, & Forbes, 2008). To establish a
theoretical and empirical foundation for our discussion, we first provide a brief overview of
stereotype threat research.

OVERVIEW OF STEREOTYPE THREAT

Stereotype threat is a unique account for group differences in academic test performance. While other explanations have focused on stable aspects of a person’s early educational environment (e.g., Eccles, Jacobs, & Harold, 1990), socio-economic status (e.g., Kozol, 1991), or genetic makeup (e.g., Herrnstein & Murray, 1994), stereotype threat is conceptualized as a situation-specific bias. The implication is that, even after controlling for the influence of all of these other factors, situational reminders of negative stereotypes can lead to the underperformance of intellectually stigmatized group members. However, if the threat is created by the situation, then situations can also be altered to reduce the threat and, by doing so, alleviate or eliminate the apparent group differences in ability.

To test this reasoning, Steele and Aronson (1995) administered to African American and White undergraduates at Stanford University a test composed of some of the more difficult questions from the verbal section of the GRE. In one condition designed to mirror standardized testing situations, this test was described as a diagnostic measure of intellectual ability. In a comparison condition, the test was described in non-diagnostic terms as a generic problem-solving exercise. According to most other explanations of the race gap, altering the description of this test should have little effect on the performance of the African American students. However, this description did have a marked effect on performance; although African Americans performed worse than their White peers when the test was described as being diagnostic of intellectual ability, they performed nearly equal to White students when the test was framed as a task unrelated to intelligence after taking into account individual differences in past test scores.

These findings have since inspired a substantial body of research designed to test the prevalence of stereotype threat among different group members in other performance situations. For example, Spencer, Steele, and Quinn (1999) demonstrated that women perform worse than men on a math test when told that the test had revealed gender differences in the past, but that women’s performance matched that of men when the same test was described as “gender fair.” Research with other stigmatized groups has demonstrated that stereotype threat can reduce the intelligence test performance of Latinos (Gonzalez, Blanton, & Williams, 2002) and college students from low socioeconomic backgrounds (Croizet & Claire, 1998), as well as older adults completing a memory test (Hess, Auman, Colcombe, & Rahal, 2003).

The prospect of confirming a negative stereotype has also been shown to affect the performance of individuals from groups who are not typically targeted by negative stereotypes but have lower relative status within the situation. For example, Aronson and his colleagues (1999) found that White male math majors performed more poorly on a math test when they were told that their performance would be compared to that of Asian men. Whites have also been found to perform more poorly than Blacks on a motor task (e.g., golf putting) when that task is described to them as measuring their natural athletic ability (Stone, 2002; Stone, Lynch, Sjomeling, & Darley, 1999). In addition, Whites exhibit more racial bias on a reaction time task when they think that task could reveal unconscious negative attitudes towards African Americans and confirm the stereotype that Whites are racist (Frantz, Cuddy, Burnett, Ray, & Hart, 2004). The fact that stereotype threat can
influence performance regardless of whether someone belongs to a high or low status group attests to the situational nature of this threat.

Having established the prevalence of the phenomenon, researchers have turned their attention to understanding how exactly stereotype threat impairs performance. Initially, there was some debate about whether or not stereotype threat is driven primarily by cognitive or affective processes (Wheeler & Petty, 2001). The question is whether stereotype threat occurs because primed negative stereotypes automatically translate into stereotypic behavior (Dijkstra & van Knippenberg, 1998) or is more akin to what individuals who are high in test anxiety experience when taking a test (Sarason, 1984). Recent evidence suggests that either account is likely to be an oversimplification (Marx & Stapel, 2006a). Similarly, it is our contention that the accumulated evidence suggests that stereotype threat exerts its influence through both cognitive and affective mechanisms.

On the cognitive side, stereotype threat appears to harm performance on intellectual tasks by activating negative stereotypes (Davies, Spencer, Quinn, & Gerhardstein, 2002; Steele & Aronson, 1995), cuing negative thoughts (Cadinu, Maas, Rosabiane, & Kiesner, 2005), and consuming the executive resources necessary for high-order cognitive processing (Beilock, Rydell, & Mcconnell, 2007; Inzlicht, McKay, & Aronson, 2006; Schmader & Johns, 2003). On the affective side, stereotype threat produces physiological responses associated with anxiety, such as arousal (Ben-Zeev, Fein, & Inzlicht, 2005; O’Brien & Crandall, 2003) and increased blood pressure (Blascovich, Spencer, Quinn, & Steele, 2001), as well as feelings of frustration (Marx & Stapel, 2006b). Given the totality of the evidence, we suggest that the process by which performance is impaired in situations of stereotype threat results from a complex interplay between cognitive, affective, and motivational processes (Schmader et al., 2008).

In this chapter, we consider how uncertainty might provide a useful framework for understanding the manner in which stereotype threat reduces performance via cognitive, affective, and motivational mechanisms. We argue that uncertainty created by stereotype threat evokes a state of meta-cognitive vigilance and regulation that consumes the cognitive resources necessary for adequate performance on cognitive tasks. Our discussion of these processes is based on the findings that stereotype threat impairs the executive functions necessary for optimal task performance. Because evidence suggests that uncertainty plays a larger role in the lives of individuals who try to excel in domains where their group is negatively stereotyped, we also consider uncertainty experienced outside of discrete performance situations. Here, we focus on uncertainty about the cause of performance outcomes, and its potential influence on motivation and future achievement in that domain. We conclude with a discussion of how understanding the influence of uncertainty can be applied to develop strategies to defeat stereotype threat.

**UNCERTAINTY DURING PERFORMANCE**

To understand how uncertainty contributes to stereotype threat, it is first important to discuss what we think are the specific origins of uncertainty in stigmatizing situations. We start from the substantial body of social psychological research showing that, on average, individuals have strong egocentric biases that lead them to be overconfident about their traits and abilities (e.g., Dunning, Griffin, Milojkovic, & Ross, 1990). As a result, much of the time individuals enter into performance situations with a base of self-confidence that allows them to focus attention on the task at hand without being overly concerned about how their performance might reflect negatively on the self. However, for members of negatively stereotyped groups, the mere awareness of cultural stereotypes suggesting they
to a high or low status

lack ability in certain domains calls these egocentric biases into question. We suggest that this occurs because stereotypes present a hypothesis for one’s behavior that directly conflicts with the general tendency to expect positive outcomes. As a consequence, targets are more likely to question their ability to perform well. Consistent with this idea, research has found that stereotype threat promotes self-handicapping (Stone, 2002), increases activation of doubt-related concepts (Steele & Aronson, 1995), and can lower expectations for success (Stangor, Carr, & Kiang, 1998).

Although anyone can experience doubt when entering into a high-stakes performance situation, there are reasons to think that stereotype threat creates uncertainty that is uniquely salient. Studies of stereotype threat often involve recruiting participants who have invested a great deal of time and effort into performing well in the domain where their group is negatively stereotyped. For example, Steele and Aronson’s seminal studies involved students from one of America’s most prestigious universities, while others have found that the individuals who see the performance domain as self-defining are most susceptible to reduced performance under stereotype threat (Aronson et al., 1999; Stone et al., 1999).

Given that such domain-identified individuals are likely to be schematic for the relevant trait (von Hippel, Hawkins, & Schoeler, 2001), the discrepancy between their own positive self-schema and the negative stereotype about their group might be especially large and unsettling. This idea stems from research showing that cognitions that conflict with a positive self-view increase the motivation to resolve the inconsistency and reestablish a sense of psychological equanimity (e.g., Thibodeau & Aronson, 1992). Thus, stigmatized individuals who have been relatively successful (at least compared with other ingroup members) and who are motivated to continue that success might be most attuned to ambiguity over whether they will do well (as past experience or motivation would predict) or will do poorly (as the stereotype predicts). In practical terms, the high achieving female engineering major or minority college student might find themselves in a challenging performance situation where they are forced to consider, “Have I reached the limit of my ability?” For the person who is not targeted by negative stereotypes, there is less reason to wonder if such a limit exists.

We propose that a complementary source of uncertainty stems from competing ways of perceiving oneself within the threatening situation. In concert with a prediction for poor performance, stereotype salience creates the prospect for being construed (either by oneself or others; Inzlicht & Ben-Zeev, 2003) as a deindividuated exemplar of the stigmatized social group. Indeed, recent research shows that threatening situations increase the salience of the stigmatized social self (Marx, Stapel, & Muller, 2005). Although individuals often seek to maintain a balance between competing needs for uniqueness and belonging (Brewer, 1991), we expect that the motivation to contend with questions of self-definition is likely to be heightened when a devalued social identity is activated in that particular context. Consistent with this assumption, several studies have found that targeted individuals are buffered from the negative effects of stereotype threat when focused on their personal, non-stereotyped identity (e.g., Ambady, Paik, Steele, Owen-Smith, & Mitchell, 2004) or primed with a positively stereotyped social identity (e.g., Shih, Pittinsky, & Ambady, 1999). Together, we interpret these results as suggesting that situations of stereotype threat lead not only to uncertainty about the eventual outcome of one’s performance, but also to uncertainty about how to construe the self within a given performance situation. The question then becomes, how do individuals try to manage this uncertainty and what are the implications of those efforts for performance?
Coping with the Epistemic Consequences of Uncertainty

One general reaction to feeling uncertain is to become more vigilant towards cues in the environment that might help to disambiguate the situation. Past research indicates that uncertainty is associated with increased motivation to process information in a systematic manner (e.g., Tiedens & Linton, 2001). Furthermore, uncertainty has been found to increase the motivation to collect information from one’s environment as a means of achieving a sense of epistemic clarity (e.g., Weary, Tobin, & Edwards, Chapter 5). Given our analysis that stereotype threat raises questions about one’s abilities and self-definition, we suggest that the possibility of stereotype confirmation can increase the motivation to attend to and process information that could reveal the degree to which the targeted individual is approaching stereotype confirmation. This would likely entail more attention being paid to one’s own behavior and actions, as well as a heightened concern about the reactions of others in the immediate environment.

Several lines of research suggest that the threat of being stigmatized can increase vigilance. Early work suggested that members of marginalized social groups are more mindful in their interactions with others (Fraise, Blackstone, & Scherbaum, 1980). More recent work has found evidence that such vigilance can also be situation specific. For example, women become more vigilant to cues of gender identity threat when expecting to interact with a sexist man (Kaiser, Vick, & Major, 2006). This increased vigilance is most pronounced among women who are high in stigma consciousness (Finel, 1999)—the concern about being evaluated or judged in terms of one’s social identity. More relevant to the current discussion, it has also been found that individuals high in stigma consciousness are more susceptible to the effects of stereotype threat (Brown & Finel, 2003). Additional evidence of vigilance in a performance situation comes from a recent study showing that minority students who value academic success are automatically more attentive to their errors on a task if it is framed as a measure of intelligence but not when it is described in neutral terms (Forbes, Schmader, & Allen, 2008).

On the surface, increased vigilance to the task might not necessarily seem detrimental. However, there is reason to suspect that trying to monitor one’s behavior and performance could be particularly disruptive. Research shows that stereotype threat decreases performance only on intellectual tasks that require high-order cognitive processing to complete successfully (e.g., O’Brien & Crandall, 2003; Quinn & Spencer, 2001; Spencer et al., 1999). Performing complex cognitive tasks, like the verbal and quantitative problems found on most standardized achievement tests, often depends on efficiently coordinating information processing while avoiding distraction from competing goals. This basic ability is best captured by theory and research on working memory (WM; Feldman Barrett, Tugade, & Engle, 2004). WM is heavily involved in performance on cognitively complex and taxing activities, such as measures related to general intelligence (e.g., Engle, Tuholski, Laughlin, & Conway, 1999).

Our research has demonstrated that individuals perform more poorly on complex intellectual tests under stereotype threat because these situations can reduce the efficiency of WM (Schmader & Johns, 2003). Across two studies, both women and Latino participants had greater difficulty remembering a set of words in the context of a simultaneous processing task (solving equations) if this task was described to them as a measure of an ability they are stereotyped to lack. In addition, reductions in WM mediated the effect of stereotype threat on women’s math performance. Subsequent studies have conceptually replicated these effects (Beilock et al., 2007) and documented parallel findings that stereotype threat hurts performance by increasing mental workload (Croiset, Despres, Gauzins, Huguet, & Loyens, 2004) and can drain resources needed for executive control (Inzlicht et al., 2006).
Together these findings provide converging evidence that intellectually threatening situations can consume the cognitive resources that are required for optimal performance on challenging cognitive tasks.

One question left unanswered by these studies is how exactly stereotype threat taxes WM. One possible mechanism is that the increased vigilance cued by uncertainty draws on this cognitive resource. Because working memory is of limited capacity (Feldman Barrett et al., 2004), situations that prime competing processing goals could easily siphon residual capacity that would normally be dedicated to the task at hand. As a result, performance will suffer to the degree that a task requires significant levels of focus and attention regulation (Beilock, Kulp, Holt, & Carr, 2004). From our analysis, the motivation to monitor one’s performance for signs of failure represents just such a competing goal that could (ironically) consume attention needed for optimal task performance. As a result, increased cognitive load should be associated with poorer performance among those under stereotype threat. Interestingly, Jamieson and Harkins (2007) have recently found evidence consistent with this idea. In their studies, women under stereotype threat were more likely to make reflexive eye movements on an antisaccade task—an incorrect response that indicates depleted executive resources. However, stereotype-threatened women were also faster to make corrections when they made these errors, which in our view suggests that they were dedicating more attentional resources to monitoring their performance.

We suspect, however, that the nature of vigilance is somewhat more complex than simply attending to the immediate environment. Because vigilance increases as a direct response to a sense of uncertainty, targets might also be motivated to interpret the cues they perceive. If, for example, performance monitoring takes the form of constantly questioning how one is doing, then resolving uncertainty requires understanding the meaning of one’s behaviors. This could be especially disruptive given that the activation of negative stereotypes appears to increase negative thoughts and feelings about the task and about the self (Beilock et al., 2007). For example, in a recent study, minority students in a stereotype threat situation showed a negative correlation between the errors they made on a response-competition task and lower performance self-esteem. By contrast, minority students completing the same task in a non-threat control condition did not seem to interpret their errors as relevant to self-worth, even though they made just as many errors (Forbes et al., 2008). These data suggest that beyond detecting errors, targets of stereotype threat tend to interpret their errors in a biased manner as a negative reflection on their abilities.

Moreover, past research suggests that threatened individuals are also likely to attend to and interpret their internal states (e.g., level of arousal, distracting thoughts). Studies showing that directing targets to misattribute their arousal reduces stereotype threat effects are consistent with this idea (Ben-Zeev et al., 2005; Stone et al., 1999). Such heightened awareness of physiological arousal and feelings of anxiety opens the door for recursive effects of meta-cognitive regulation. Anxious thoughts and feelings that might generally be quite normal in high-stakes performance situations could prime secondary concerns about feeling anxious that then increase the physiological and psychological experience of stress above manageable levels. For example, Cadieu et al. (2005) have demonstrated that people performing under stereotype threat report having more negative thoughts during the performance and negative thoughts earlier in the task predict poorer performance later in the task.

Coping with Emotional Consequences of Uncertainty

One implication of our analysis is that stereotype-threatened individuals are not just passive recipients of the devaluation presented by situational stigmatization. We believe that it is
important to consider the ways in which stigmatized individuals actively try to deal with the aversive nature of stereotype threat. Thus, the state of uncertainty that we have described extends beyond vigilance to the process of coping with negative thoughts and feelings that arise. Based on the assumption that stereotype threat is experienced as an acute stressor, uncertainty could further contribute to underperformance by encouraging coping efforts designed to achieve and maintain one's composure.

For example, if it is the case that individuals under stereotype threat find themselves having negative meta-cognitions about feeling anxious during a performance situation, then individuals under those circumstances might be more likely to engage in active efforts to avoid or suppress those negative thoughts and feelings. According to appraisal-based models of stress and coping (e.g., Lazarus & Folkman, 1984), attempts to avoid or suppress negative feelings can occur in situations that create uncertainty and present a potential threat to self-integrity (e.g., Skinner & Brewer, 2002). Given that the fear of stereotype confirmation is, by definition, an ego-threatening experience it seems reasonable to suspect that stereotype threat could lead to coping strategies focused on regulating thoughts and feelings stemming from the threat. Indeed, there is evidence that stereotype threat promotes denial (von Hippel et al., 2005) and avoidant goal orientations (Selbt & Förster, 2004). Furthermore, it is interesting to note that research that has attempted to measure participants' self-reported feelings of anxiety during stereotype threat has often met with mixed results (Wheeler & Petty, 2001), even though studies that have used implicit measures of anxiety suggest that stereotype threat does induce discomfort (Bosson, Haymovitz, & Pinel, 2004). This dissociation between self-report and indirect measures of anxiety suggests that people experiencing stereotype threat might be trying to cope with the uncertainty of the situation by denying their feelings of anxiety and threat.

Although attempting to regulate negative thoughts and feelings is a fairly direct approach to coping with the uncertainty of stereotype threat, it likely comes at a cost. Research on the effects of emotion regulation has shown that trying to control the experience of negative feelings can exact a measurable toll on cognitive functioning (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Richards & Gross, 2000). For example, Schmeichel, Vohs, and Baumeister (2003) found that suppressing any visible signs of emotion while viewing a film containing distressing images significantly reduced performance on a subsequent analytical reasoning test. More recent research (Schmeichel, 2007) has shown that emotion regulation reduces performance on the same dual-processing measure of working memory capacity we have used in our research on the causes of stereotype threat effects (Schmader & Johns, 2003). These studies indicate that regulating emotions can deplete the resources necessary to complete a task that depends heavily on high-order cognitive functioning.

The most direct evidence that stereotype threat reduces working memory efficiency through affect regulation processes comes from studies we recently conducted to test this hypothesis (Johns, Inzlicht, & Schmader, 2008). In one study we employed a dot probe reaction time task—a task commonly used to measure anxiety indirectly—in order to capture attempts at suppressing the expression of anxiety under threat. We had women complete this task either while expecting to take a difficult math test (i.e., stereotype threat) or not. For half the women, we described the dot probe task in neutral terms as a measure of perceptual ability. For the remaining participants, we described the task as a measure of anxiety and provided information about how it measures anxiety. Following this task, participants completed a measure of working memory.

We reasoned that if stereotype threat produces anxiety that targets then try to suppress, telling them their anxiety was being measured would motivate them to change their responses on the task in order to avoid appearing anxious. In the stereotype threat condition,
actively try to deal with the threat that we have described. Thoughts and feelings that are experienced as an acute stressor, when not actively suppressed, can promote coping efforts that encourage cognitive regulation.

When individuals find themselves in performance situations, they often engage in active efforts to regulate their responses to avoid or suppress thoughts and present a potential threat. For example, in the context of stereotype threat, it is reasonable to suspect that stereotype threat is used to regulate thoughts that are threatening to cope with the threat. This is a fairly direct and efficient method, but it comes at a cost. To control the experiment (Bosson, 2008; Schmeichel, 2008), emotion while regulating on a subliminal basis has shown that the regulation of working memory threat effects can deplete the cognitive resources needed to perform the task, leading to decreased efficiency.

Women showed evidence of increased anxiety when the dot probe task was described as neutral, suggesting that stereotype threat increased anxiety. However, when the task was described as a measure of anxiety, women under stereotype threat responded in a manner suggesting they were trying to avoid appearing anxious. More importantly, responses on the dot probe were correlated with stereotype threat-induced reductions in working memory. When completing the dot probe described in neutral terms, increased attention to anxiety-related words was associated with lower working memory. In comparison, shifting attention away from anxiety words when the dot probe was described as a measure of anxiety also predicted lower working memory. These results suggest that women under stereotype threat try to regulate their negative affect but this regulation process can reduce the cognitive resources that would normally be dedicated to task performance.

To summarize, we propose that the stigmatized individuals often perform more poorly on complex cognitive tasks because the activation of self-relevant negative stereotypes creates a sense of uncertainty about oneself and one’s performance. In response to this uncertainty, individuals under threat cope by actively suppressing and denying anxious thoughts and feelings they are having during the performance situation (see also Cramer, Chapter 19). Individuals also become more vigilant to cues within themselves and the environment as a means of understanding what these cues might imply about the self. Unfortunately, either one of these coping efforts might compromise working memory. We suspect, however, that it is the convergence of these processes that ultimately saps the resources critical for performance (Schmader et al., 2008). Having outlined the ways in which uncertainty increases meta-cognitive processing during a performance situation, we next turn to the influence of uncertainty outside of specific performance contexts.

**Uncertainty Outside the Performance Domain**

An examination of uncertainty experienced by those who are socially stigmatized would be incomplete if we did not also consider broader feelings of uncertainty about how to explain and predict outcomes received in stereotype-relevant domains. Those who are negatively stereotyped might often feel uncertain about how to explain past performance outcomes and predict future performance in the stereotyped domain. The consequence of uncertainty about one’s abilities can have important implications for task involvement and motivation.

**Explaining Past Performance**

The processes we have described make it likely that targets of negative stereotypes will experience relatively more negative outcomes in domains where they are expected to do poorly. After receiving such outcomes, individuals are faced with a need to cope with feedback that could be interpreted as stereotype consistent. Take, for example, an academically motivated African American student who finds himself with a lower than expected score on the GRE. Such a student might be plagued by uncertainty about the true cause of the low performance. Work by Crocker and Major (1999; Crocker, Voelk, Testa, & Major, 1991) suggests that members of stigmatized groups often experience attributional ambiguity about negative outcomes they receive from members of the majority group. This ambiguity stems from uncertainty over whether such outcomes are an indication of negative personal qualities or are the result of social prejudice. Although much of the research on attributional ambiguity has focused on coping with social rejection, failures in performance domains present a parallel predicament.
Uncertainty stems from questions about whether a poor performance indicates a lack of ability or is the result of external factors, such as a biased test. General research on attributional ambiguity has shown that one way members of socially devalued groups can resolve uncertainty about their negative outcomes is to assume that feedback received in stereotyped domains is a poor indicator of ability (Schmader, Major, & Gramzow, 2001). Moreover, stigmatized individuals are most likely to discount the validity of their academic outcomes and devalue the importance of academic success to the degree that they perceive that the overarching status structure is illegitimate (Schmader, Major, Eccleston, & McCoy, 2001).

Although attributing a poor performance to external influences such as bias may be the affectively preferable way for stigmatized individuals to cope with uncertainty about the cause of their stereotype-confirming outcomes, perceiving that one’s performance is not dictated by individual effort and motivation could have negative long-term consequences. For example, constantly discounting negative outcomes could make it difficult to accurately assess one’s true abilities in the domain. Consistent with this idea, recent research by Aronson and Inzlicht (2004) has found that African American students who are particularly vulnerable to the experience of stereotype threat also tend to be most inaccurate when assessing their performance on an intelligence test. Additionally, motivation and persistence are also likely to be casualties of externalizing lower performance on stereotype-relevant tasks. Steele (1997) and van Laar and Sidanius (2001) have argued that the repeated experience of negative outcomes and social devaluation in the academic arena can lead many members of lower status groups to feel less motivation to succeed in these domains. After all, if effort is not perceived as translating into more positive outcomes, then why continue to expend effort in these domains (Dweck, 1990)?

It is also important to consider the possible effects of taking the alternative path and assuming that a poor performance indicates a lack of ability. Individuals might be more likely to resolve attributional uncertainty about their negative outcomes by internalizing failure when they perceive that status differences between high and low status groups are fair and just (Schmader, Major et al., 2001). Dealing with attributional uncertainty by internalizing failure could lead individuals to perceive themselves as having low ability in a given domain and reduce their motivation to enter, persist, and achieve in that domain. For example, college women majoring in math-intensive disciplines who endorse negative stereotypes about women’s math aptitude report reduced confidence in their abilities and less interest in pursuing graduate study in their major (Schmader, Johns, & Barquissau, 2004). Similarly, Ehrlinger and Dunning (2003) found that women tended to evaluate their performance on a science test negatively even though their performance was objectively equivalent to that of men. More importantly, their negative performance evaluations were a stronger predictor of their interest in taking part in a scientific activity than was their actual performance.

Predicting Future Performance

As a result of the attributional uncertainty over how to explain outcomes received in stereotype-relevant domains, members of stigmatized groups also face uncertainty about how they will do in the future. If one is unsure what exactly caused a poor performance, how does one predict what will happen next time? For members of socially stigmatized groups, this predictive uncertainty is likely to be exacerbated by the feedback they receive from others. Research suggests that social perceivers use different standards when subjectively evaluating the performance of members of negatively stereotyped groups (Biernat & Manis, 1994). This research implies that although women and minorities will be viewed as objectively less capable than those who are positively stereotyped at academic tasks,
performance indicates a lack of ed test. General research on socially devalued groups can that feedback received in major, & gramzow, 2001). the validity of their academic to the degree that they schmader, major, & eccleston, ences such as bias may be the with uncertainty about the at one's performance is notive long-term consequences. make it difficult to accurately is idea, recent research by students who are particularly o be most inaccurate when ally, motivation and persist- performance on stereotype-001) have argued that the tion in the academic arena motivation to succeed in slating into more positive (dweck, 1999)? ng the alternative path and ituals might be more likely es by internalizing failure status groups are fair and uncertainty by internalizing ability in a given domain at domain. For example, orse negative stereotypes abilities and less interest in quissau, 2004). Similarly, e their performance on a ively equivalent to that of nor a stronger predictor of tual performance.

a outcomes received in face uncertainty about ed a poor performance, ed socially stigmatized feedback they receive standards when subject- groups (biernat & that will be viewed academic tasks, evaluators' subjective evaluations will be more positive. The general phenomenon is one where teachers might conclude that a high achieving african american student is very smart for someone of his race or that a girl who excels in math is quite gifted for a girl. These evaluations, though positive, belies a biased perception toward those who are intellectually stereotyped and send mixed messages that could further undermine the ability of stereotyped individuals to get an accurate read on their academic potential.

In addition, social perceivers are often reluctant to provide negative and seemingly stereotype-consistent feedback to those who are socially stigmatized out of concern with being viewed as prejudiced (harber, 1998). Although their motives are well-intentioned, the result is that those who are trying to excel in stereotype-relevant domains are likely to receive feedback about their performance that is more unreliable than that received by their non-stigmatized peers. Feedback could on some occasions underestimate abilities if based on lower, stereotype-biased standards, and could on other occasions overestimate abilities if biased by the evaluator's efforts to appear non-prejudiced. Thus, there are a number of sources to feed the uncertainty that members of negatively stereotyped groups could experience over how to predict and interpret the outcomes they might receive in the future.

One likely consequence of being unable to adequately predict one's future performance is to avoid the aversive state of uncertainty altogether by choosing not to enter into achievement contexts where one could be negatively stereotyped (davies et al., 2002). However, such situations are sometimes unavoidable, and under these circumstances uncertainty about one's performance can still lead to poor outcomes but through a mechanisms different from the cognitive deficit or disengagement mechanisms already described. Specifically, uncertainty in anticipation of a threatening performance situation might promote self-handicapping. Typically, behavioral self-handicapping has been examined as a coping response that people are most likely to employ in situations where they are uncertain of their ability to replicate a past success (berglas & jones, 1978; see also oleson & steckler, chapter 21). For those who enter into a stereotype-relevant performance situation, primed negative stereotypes in the situation paired with a past history of inconsistent performance feedback should heighten the experience of uncertainty. In an effort to cope with this uncertainty, individuals engage in behaviors to create an impediment that could explain a poor performance. For example, stone (2002) found that white athletes self-handicapped their performance by neglecting to practice their putting skills if they are told that an upcoming putting test is being used to indicate natural athletic abilities (see also keller, 2002). We suggest that self-handicapping serves as a preemptive attempt to address the uncertainty that arises when trying to predict one's performance in a stereotype threat situation.

implications and future directions

Our analysis suggests that targets of situational stigma grapple with uncertainty above and beyond what would be expected by those not in the spotlight of negative stereotypes. Questions about one's ability and the need to cope with such questions can arise before, during, and after entering into a threatening performance situation. In addition to undermining performance, uncertainty can also promote maladaptive responses such as self-handicapping and avoidance, as well as undermine the degree to which targets can accurately assess their abilities in threatening domains (aronson & inzlicht, 2004). Although the picture of situational stigma that emerges is quite bleak, understanding the influence of uncertainty also offers the possibility of developing strategies to help targets...
cope more effectively with the press of a negative stereotype. In the final section we consider how understanding the influence of uncertainty might translate into remedies to ameliorate the effects of stereotype, with an eye toward suggesting topics for future research.

As we have discussed, evidence that uncertainty contributes to the effect of stereotype threat in performance situations comes in part from studies showing increased accessibility of doubt-related thoughts (Steele & Aronson, 1995), along with evidence of anticipatory defensive reactions (Stone, 2002). These doubts, activated by the salience of a negative stereotype, set the meta-cognitive regulation process into motion that ultimately derails performance. Accordingly, one approach to reducing stereotype threat would be to undermine the perceived validity of such thoughts. Research on the self-validation hypothesis (see Bruinol, DeMarree, & Petty, Chapter 2) indicates that it is possible to alter the epistemic influence of one’s thoughts with simple head movements. The explanation for this effect is that movements associated with disagreement act as a self-generated cue that one’s thoughts are not valid, while movements associated with agreement serve as a cue for the validity of one’s thoughts. Applying this finding to stereotype threat suggests that instructing targets to shake their head in disagreement when they experience negative, doubtful thoughts could improve performance by neutralizing the disruptive influence of such thoughts.

A parallel strategy for reducing uncertainty about stereotype confirmation is to provide targets with an alternative interpretation for their negative thoughts and feelings. If performance decrements are partly the result of negative interpretations of these cues, then interventions designed to alter these interpretations could reduce stereotype threat effects on performance. For example, several studies have shown that directing targets to misattribute the arousal and anxiety they are experiencing to the nature of the situation is effective in improving performance (Ben-Zeev et al., 2005; Johns, Schmader, & Martens, 2005; Stone et al., 1999). In addition, we have recently found evidence that directing targets to reinterpret anxiety as helpful instead of harmful is also effective in eliminating the effect of stereotype threat on working memory resources (Johns et al., 2008). These findings, in addition to the research on self-validation, suggest that teaching targets techniques to neutralize the meaning of their negative thoughts and feelings could eliminate stereotype threat effects by thwarting meta-cognitive regulation processes. Future research will be needed to test the effectiveness of these ideas in real-world contexts.

The idea that uncertainty contributes to stereotype threat effects through a monitoring process that consumes working memory resources suggests another approach to preventing performance decrements. If activating a negative self-relevant stereotype induces performance monitoring by raising doubts about one’s ability, then reminders that one is a capable and valuable person should reduce the effects of stereotype threat on performance. Along these lines, Martens, Johns, Greenberg, and Schimel (2006) have shown that self-affirmation—focusing people on their most valued attribute—reduces the influence of negative stereotypes on women’s math and spatial abilities (see also Frantz et al., 2004). In addition to affirming the self, affirmations that remind targets of positive attributes possessed by other group members also appear to reduce the effects of stereotype threat on performance (McIntyre, Paulson, & Lord, 2003). Like self-affirmations, group-based affirmations might act to reduce uncertainty by providing evidence that contradicts the negative implications of the relevant stereotype. Reminders that the group as a whole is competent and valuable should effectively neutralize the potential impact of a negative stereotype suggesting inability in a given domain. Consistent with this idea, the presence of counter-stereotypic group members, like a woman who is competent in math, can also buffer targets from threat (Marx & Roman, 2002). Furthermore, affirming the group on an alternative dimension of competence has been shown to increase confidence and success
type. In the final section we discuss the effect of stereotype threat on performance, where increased accessibility of negative thoughts can ultimately derail performance. This effect is illustrated by the salience of a negative stereotype that ultimately derails performance. However, self-affirmation has been shown to be an effective way to counteract these effects (e.g., Schmader & Martens, 2006). The use of self-affirmations has been shown to reduce stereotype threat by dampening the meta-cognitive regulation process that diverts attention from the critical task. An interesting question to consider is whether such affirmations need to come from an external source (e.g., an experimenter or a teacher), or can be generated internally by targets themselves as a means of coping. For example, perhaps targets could be trained to generate implementation intentions (Gollwitzer, 1999) such that they automatically activate affirmation exemplars when they encounter situations where cues to threat are likely to be present. Future research is needed to test this intriguing idea and to examine whether targets who can successfully defeat stereotype threat have in fact adopted such a strategy.

Studying the process by which self-affirmation reduces stereotype threat seems especially useful given recent research indicating that it can also benefit targets in more naturalistic settings. In a set of longitudinal field studies, Cohen, Garcia, Apfel, and Master (2006) assigned African American college students a self-affirmation task at the beginning of the academic year. This fairly simple and brief intervention had a profoundly positive effect on the performance of these students. Most significant, their grades had improved at the end of the year enough to reduce the racial achievement gap by 40%. As with laboratory studies, less is known about how affirmation improved minority student performance in this study. As suggested previously, affirmation could have reduced the prevalence of doubt-related thoughts that would otherwise consume cognitive resources. However, the long-term nature of the effect could suggest the influence of other complementary processes. For example, it is also possible that shifting self-worth to an internal, self-determined source affirmation may reduce the tendency to employ anticipatory defensive reactions such as self-handicapping (e.g., Arndt, Schimel, Greenberg, & Fyszczynski, 2002).

Beyond suggesting an antidote to stereotype threat, the above findings also make a broader point about the pervasive influence that uncertainty can exert in the lives of stigmatized group members. As our discussion of attributional ambiguity suggests, stereotype threat targets might be left to grapple with more general questions about their value and potential in a particular domain. These feelings of uncertainty are likely to be exacerbated when stigmatized individuals find themselves in a numerical minority, struggling to conform to norms that are largely defined by a social or cultural out-group. Walton and Cohen (2007) have recently suggested that members of intellectually stigmatized groups, like ethnic minorities, experience uncertainty about their presence in settings where stereotypes could apply. As a result, minority college students are especially sensitive to information suggesting that they might not belong in such settings and show reductions in academic motivation when such questions of belonging are salient.

To address this issue, Walton and Cohen developed an intervention to help minority students realize that their experience of uncertainty was not unique. They found that the program to "normalize" uncertainty increased both motivation and academic performance of minority students. These findings provide more encouraging evidence that it is possible to
provide general tools to stigmatized individuals to help them cope effectively with the unique challenges they face. Furthermore, these results also suggest that the mere experience of uncertainty might be less of a problem than how that experience is appraised and interpreted. It is clear from this and similar studies that addressing uncertainty could offer practical strategies to reduce the pernicious influence that negative stereotypes can exert on both motivation and performance. In addition, examining how such interventions work cross-sectionally and longitudinally would enhance our theoretical understanding of the specific ways in which uncertainty contributes to stereotype threat and related phenomenon.

CONCLUSION

Stereotype threat has been nominated as one of the most important social psychological discoveries in the last two decades (Devine & Brodish, 2003). Knowing that negative stereotypes contribute to group differences in performance is a critical step toward closing performance gaps that have persisted for too long. However, identifying this effect is only the first step in the process of leveling the playing field. Developing practical and robust interventions requires a more comprehensive understanding of the specific processes by which stereotype threat exerts its effect. Our analysis of the role that uncertainty plays in the experience of stereotype threat was designed with this goal in mind. At the core of our discussion is the reminder that targets of negative stereotypes do not just passively accept their fate but actively engage in efforts to make sense of their experience and cope with the unique demands they confront. In this way, we hope that a complete understanding of stereotype threat will contribute to the broader efforts aimed at developing strategies to ensure that all members of society are afforded the opportunity to reach their full potential in whatever domain they choose.

REFERENCES


cooperate effectively with the next that the mere experience is appraised and the uncertainty could offer stereotypic interventions that can achieve such understandings. This workable understanding of the and related phenomenon.


Recollection of ruminating. Sex Roles, 111–125.


