

The Effects of Stereotype Activation on Behavior: A Review of Possible Mechanisms

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Considerable recent research has examined the effects that activated stereotypes have on behavior. Research on both self-stereotype activation and other-stereotype activation has tended to show that people behave in ways consistent with the stereotype (e.g., walking more slowly if the elderly stereotype is activated). Interestingly, however, the dominant account for the behavioral effects of self-stereotype activation involves a *hot* motivational factor (i.e., stereotype threat), whereas the dominant account for the behavioral effects of other-stereotype activation focuses on a rather *cold* cognitive explanation (i.e., ideomotor processes). The current review compares and contrasts the behavioral research on self- and other-stereotype activation and concludes that both motivational and cognitive explanations might account for effects in each domain.

Numerous recent studies have shown that activating stereotypes can influence people's behavior. Typically, activating a stereotype leads people to behave in stereotype-consistent ways. For example, in one study, activating the stereotype of the elderly led elderly people to show impaired memory performance (Levy, 1996). In this article, we provide a critical examination of this burgeoning literature. In particular, we examine the multiple processes that might account for the behavioral effects of stereotype activation.

We define *stereotype activation* as the increased accessibility of the constellation of attributes that are believed to characterize members of a given social category. For example, some people associate the category Asians with the attributes intelligent, quiet, and short. Stereotypes can be activated by a broad array of environmental stimuli, including both very subtle (e.g., subliminal face or word presentation) and blatant (e.g., explicitly reminding participants of a given group stereotype) events. We use the terms *behavior* or *behavioral effect* to refer to the changes in an individual's overt actions following stereotype activation. Because much of the work on the behavioral consequences of stereotype activation has concerned academic performance, this behavior is highlighted in our review and discussion. However, the principles outlined in this article are more broadly applicable, and we discuss other stereotype-induced behavioral changes as well.

In this review, we distinguish between two primary features of stereotypes. First, in most of the published literature, the activated

stereotype content has been evaluatively positive or negative. For example, studies have activated either positive (e.g., wise) or negative (e.g., senile) aspects of the elderly stereotype (Levy, 1996), though both could presumably be activated together. Second, activated stereotypes can pertain to one's own group memberships (self-stereotypes), or they can pertain to groups to which one does not belong (other-stereotypes). For example, the elderly stereotype could be primed in members of the elderly themselves (a self-stereotype) or in individuals who are not elderly, such as college students under the age of 25 (an other-stereotype). The behavioral effects of priming stereotypes fall into two categories. That is, people's behavior can become consistent with the primed stereotype (assimilation effect) or inconsistent with the primed stereotype (contrast effect). Table 1 catalogs and summarizes the various studies of stereotype activation and behavior, and Table 2 provides frequency counts for each type of effect.¹

As Tables 1 and 2 show, with five exceptions (or 20% of the studies), the published experiments involving self-stereotypes to date have demonstrated that people assimilate their behavior to the activated stereotype. For example, in one study, when African Americans had the self-stereotype of African Americans activated, they performed worse on a test of academic skill, thereby behaving more similar to the African American stereotype of academic underachievement (e.g., Steele & Aronson, 1995). Results from experiments examining the impact of activated other-stereotypes are similar in that they too typically show assimilation to the content of the activated stereotype, though contrast occasionally occurs (i.e., in 17% of the studies). For example, in one study
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¹ Because the primary goal of this article is to provide a conceptual review rather than an empirical one (e.g., focusing on effect sizes, etc.), the table catalogs all studies we could find that were published or that we received prior to January 1, 2001. Manuscripts were located by searching the PsycINFO database using the search terms *stereotype activation* and *behavior*, *automatic behavior*, *stereotype threat*, and *stereotype and performance*. The reference lists of the relevant articles obtained from this search were then scanned for additional relevant articles.

Table 1
Published Effects of Stereotype Activation on Behavior

Experiment	Participants	Means of stereotype activation	Stereotype	Type of prime	Performance results	Type of effect
Self-stereotypes Cheryan & Bodenhausen (2000)	Asian American female undergraduates	Completed ethnicity Collective Self-Esteem Scale	Asian	Conscious	Lowered math performance	Contrast
	Asian American female undergraduates	Completed gender Collective Self-Esteem Scale	Female	Conscious	No effect on math performance	
Croizet & Claire (1998)	Low SES French undergraduates	Told test a reliable measure of verbal ability	Low SES (low verbal ability)	Conscious	Lowered verbal performance	Assimilation
	Elderly	Subliminal exposure to negative elderly stereotype words (e.g., senile)	Elderly (negative)	Unconscious	No effect on walking speed	
Hausdorff et al. (1999)	Elderly	Subliminal exposure to positive elderly stereotype words (e.g., wise)	Elderly (positive)	Unconscious	Faster walking speed, more swing time	Assimilation
	Female undergraduates	Only member of own gender in the group	Female	Conscious	Lowered math test accuracy, tendency for lowered performance	Assimilation
Inzlicht & Ben-Zeev (2000), Exp. 1	Female undergraduates	Only member of own gender in the group	Female	Conscious	No effect on verbal performance	
Inzlicht & Ben-Zeev (2000), Exp. 2	Female undergraduates	Only member of own gender in the group	Female	Conscious	Lowered math test accuracy	Assimilation
	Male undergraduates	Only member of own gender in the group	Male	Conscious	No effect on math performance	
Kray et al. (2001), Exp. 1	Female MBA students	Told task an accurate gauge of negotiating abilities and limitations	Female (poor at negotiation)	Conscious	Reduced negotiation outcomes (against men)	Assimilation
Kray et al. (2001), Exp. 2 ^a	Male MBA students	Told rational, assertive, and self-interested negotiators better than emotional and accommodating negotiators	Male (skilled at negotiation)	Conscious	Improved negotiation outcomes (against women)	Assimilation
	Male MBA students	Told rational, assertive, and self-interested negotiators better than emotional and accommodating negotiators	Male (skilled at negotiation)	Conscious	No effect on negotiation outcomes (against men)	
Kray et al. (2001), Exp. 3 ^{ab}	Male MBA students	Told rational, assertive, and self-interested negotiators better than emotional and accommodating negotiators, and told men and women differ in performance on task	Male (skilled at negotiation)	Conscious	Reduced negotiation outcomes (against women, relative to subtle stereotype activation)	Contrast
	Male undergraduates	Told rational, assertive, and self-interested negotiators better than emotional and passive negotiators, and told men and women differ in performance on task	Male (skilled at negotiation)	Conscious	Reduced negotiation outcomes (against women)	Contrast

Table 1 (*continued*)

Experiment	Participants	Means of stereotype activation	Stereotype	Type of prime	Performance results	Type of effect
Levy (1996), Exp. 1	Elderly men and women	Subliminal exposure to senility elderly stereotype words (e.g., senile)	Elderly (senility)	Unconscious	Decreased memory	Assimilation
	Elderly men and women	Subliminal exposure to wisdom elderly stereotype words (e.g., wise)	Elderly (wisdom)	Unconscious	Increased memory	Assimilation
Leyens et al. (2000) ^a	Male undergraduates	Told men do not process affective information as effectively as women	Male (poor performance on affective tasks)	Conscious	Lowered performance on affect decision task	Assimilation
	Male undergraduates	Told men do not process affective information as effectively as women	Male (poor performance on affective tasks)	Conscious	No effect on lexical decision task	
	Male undergraduates	Told men do not process affective information as effectively as women	Male (poor performance on affective tasks)	Conscious	No effect on valence decision task	
Oyserman et al. (1995), Exp. 2	African American middle school students	Completed identity task about being African American	African American	Conscious	Increased math performance (among those high in awareness of racism, connectedness, and African American achievement)	Contrast
Shih et al. (1999), Exp. 1	Asian American female undergraduates	Completed questionnaire with questions about languages known and used	Asian	Conscious	Improved math test accuracy, tendency for improved performance	Assimilation
	Asian American female undergraduates	Completed questionnaire with question about coed vs. single-sex housing	Female	Conscious	Lowered math test accuracy, tendency for lowered performance	Assimilation
Shih et al. (1999), Exp. 2	Canadian Asian female undergraduates	Completed questionnaire with questions about languages known and used	Asian	Conscious	Lowered math test accuracy and performance	Contrast
	Canadian Asian female undergraduates	Completed questionnaire with question about coed vs. single-sex housing	Female	Conscious	Lowered math test accuracy and performance	Assimilation
Spencer et al. (1999), Exp. 1	Female undergraduates	Took difficult math test (assumed stereotype activated by testing situation)	Female (math underperformance)	Conscious	Lowered math performance	Assimilation
Spencer et al. (1999), Exp. 2 ^a	Female undergraduates	Told math test yielded gender differences in past	Female (math underperformance)	Conscious	Lowered math performance	Assimilation
Spencer et al. (1999), Exp. 3	Female undergraduates	Took difficult math test (assumed stereotype activated by testing situation)	Female (math underperformance)	Conscious	Lowered math performance	Assimilation
Steele & Aronson (1995), Exp. 1	African American undergraduates	Told test would assess verbal abilities and limitations	African American (low verbal ability)	Conscious	Lowered verbal performance	Assimilation
Steele & Aronson (1995), Exp. 2	African American females	Told test would assess verbal abilities and limitations	African American (low verbal ability)	Conscious	Lowered verbal performance	Assimilation
Steele & Aronson (1995), Exp. 4	African American undergraduates	Indicated race prior to test	African American	Conscious	Lowered verbal performance	Assimilation

(Table continues)

Table 1 (continued)

Experiment	Participants	Means of stereotype activation	Stereotype	Type of prime	Performance results	Type of effect
Stone et al. (1999), Exp. 1	Caucasian undergraduates	Told golf task required strategic thinking	Caucasian (Sports intelligence)	Conscious	No effect on golf performance	Assimilation
	Caucasian undergraduates	Reported race prior to golf task	Caucasian	Conscious	No effect on golf performance	Assimilation
	African American undergraduates	Told golf task required natural ability	African American (natural athletic ability)	Conscious	No effect on golf performance	Assimilation
	African American undergraduates	Reported race prior to golf task	African American	Conscious	Lowered golf performance	Assimilation
Walsh, Hickey, & Duffy (1999), Exp. 2 ^a	Male undergraduates	Told men achieve higher scores than females on test	Male (math performance)	Conscious	Improved math performance	Assimilation
Other stereotypes						
Aronson et al. (1999), Exp. 1	Caucasian and Jewish male undergraduates	Told Asians better than Caucasians at math	Asian (math performance)	Conscious	Lowered math performance	Contrast
Aronson et al. (1999), Exp. 2	High math-identified Caucasian male undergraduates	Told Asians better than Caucasians at math	Asian (math performance)	Conscious	Lowered math performance	Contrast
	Low math-identified Caucasian male undergraduates	Told Asians better than Caucasians at math	Asian (math performance)	Conscious	Improved math performance	Assimilation
Bargh et al. (1996), Exp. 2a, & 2b	Male and female undergraduates	Unscrambled sentence task with elderly content	Elderly	Conscious	Decreased walking speed	Assimilation
Bargh et al. (1996), Exp. 3	Caucasian male undergraduates	Subliminal exposure to African American faces	African American	Unconscious	Increased hostility	Assimilation
Dijksterhuis & Van Knippenberg (1998), Exp. 1	Male and female undergraduates	Generated characteristics of a typical professor	Professor	Conscious	Improved performance on general knowledge test	Assimilation
	Male and female undergraduates	Generated characteristics of a typical secretary	Secretary	Conscious	No effect on performance on general knowledge test	Assimilation
Dijksterhuis & Van Knippenberg (1998), Exp. 2	Male and female undergraduates	Generated characteristics of a typical professor	Professor	Conscious	Improved performance on general knowledge test	Assimilation
Dijksterhuis & Van Knippenberg (1998), Exp. 3	Male and female undergraduates	Generated characteristics of a typical soccer hooligan	Soccer hooligan	Conscious	Lowered performance on general knowledge test	Assimilation
Dijksterhuis & Van Knippenberg (1998), Exp. 4	Male and female undergraduates	Generated characteristics of a typical professor	Professor	Conscious	Improved performance on general knowledge test (relative to soccer hooligan prime)	Assimilation
	Male and female undergraduates	Generated characteristics of a typical soccer hooligan	Soccer hooligan	Conscious	Lowered performance on general knowledge test (relative to professor prime)	Assimilation
Dijksterhuis et al. (2000), Exp. 1	Male and female undergraduates	Subliminal exposure to elderly stereotype words	Elderly	Unconscious	Decreased memory (among those with high contact with the elderly)	Assimilation
Dijksterhuis et al. (2000), Exp. 2	Male and female undergraduates	Subliminal exposure to elderly stereotype words	Elderly	Unconscious	Decreased memory (among those with strong stereotypic associations)	Assimilation

Table 1 (*continued*)

Experiment	Participants	Means of stereotype activation	Stereotype	Type of prime	Performance results	Type of effect
Dijksterhuis & Van Knippenberg (2000), Exp. 1	Male and female undergraduates	Unscrambled sentence task with political content	Politician	Conscious	Increased length of essays (when not in front of a mirror)	Assimilation
Dijksterhuis & Van Knippenberg (2000), Exp. 2	Male and female undergraduates	Generated characteristics of a typical soccer hooligan	Soccer hooligan	Conscious	Decreased performance on general knowledge test (when not in front of a mirror, relative to professor prime)	Assimilation
	Male and female undergraduates	Generated characteristics of a typical professor	Professor	Conscious	Increased performance on general knowledge test (when not in front of a mirror, relative to soccer hooligan prime)	Assimilation
Dijksterhuis et al. (1998), Exp. 1	Male and female undergraduates	Generated characteristics of a typical professor	Professor	Conscious	Improved performance on general knowledge test (relative to supermodel prime)	Assimilation
	Male and female undergraduates	Generated characteristics of a typical supermodel	Supermodel	Conscious	Lowered performance on general knowledge test (relative to professor prime)	Assimilation
Kray et al. (2001), Exp. 2 ^a	Female MBA students	Told rational, assertive, and self-interested negotiators better than emotional and accommodating negotiators	Male (skilled at negotiation)	Conscious	No effect on negotiation outcomes	
Kray et al. (2001), Exp. 3 ^{a,b}	Female MBA students	Told rational, assertive, and self-interested negotiators better than emotional and accommodating negotiators, and told men and women differ in performance on task	Male (skilled at negotiation)	Conscious	Improved negotiation outcomes (against men, relative to subtle activation)	Assimilation
Kray et al. (2001), Exp. 4 ^a	Female undergraduates	Told rational, assertive, and self-interested negotiators better than emotional and passive negotiators, and told men and women differ in performance on task	Male (skilled at negotiation)	Conscious	Improved negotiation outcomes (against men)	Assimilation
	Female undergraduates	Told rational, assertive, and self-interested negotiators better than emotional and passive negotiators, and told men and women differ in performance on task	Male (skilled at negotiation)	Conscious	No effect on negotiation outcomes (against women)	
Levy (1996), Exp. 2	Individuals aged 18–35	Subliminal exposure to wisdom elderly stereotype words (e.g., wise)	Elderly (wisdom)	Unconscious	No effect on memory	
	Individuals aged 18–35	Subliminal exposure to senility elderly stereotype words (e.g., senile)	Elderly (senility)	Unconscious	No significant overall effect on memory	

(Table continues)

Table 1 (continued)

Experiment	Participants	Means of stereotype activation	Stereotype	Type of prime	Performance results	Type of effect
Leyens et al. (2000) ^a	Female undergraduates	Told men do not process affective information as effectively as women	Male (poor performance on affective tasks)	Conscious	No effect on affect decision task	
	Female undergraduates	Told men do not process affective information as effectively as women	Male (poor performance on affective tasks)	Conscious	No effect on lexical decision task	
	Female undergraduates	Told men do not process affective information as effectively as women	Male (poor performance on affective tasks)	Conscious	No effect on valence decision task	
Stone et al. (1999), Exp. 1	Caucasian undergraduates	Told golf task required natural ability	African American (natural athletic ability)	Conscious	No effect on golf performance	
	African American undergraduates	Told golf task required strategic thinking	Caucasian (sports intelligence)	Conscious	Lowered golf performance	Contrast
Stone et al. (1999), Exp. 2	Caucasian undergraduates with high athletic engagement	Told golf task required natural ability	African American (natural athletic ability)	Conscious	Lowered golf performance (when not given misattribution for hypothesized arousal)	Contrast
	Caucasian undergraduates with low athletic engagement	Told golf task required natural ability	African American (natural athletic ability)	Conscious	No effect on golf performance	
Walsh, Hickey, & Duffy (1999) ^a	Female undergraduates	Told men achieve higher scores on test	Male (math performance)	Conscious	Improved math performance (relative to controls)	Assimilation
Wheeler et al. (2001), Exp. 1	Non-African American undergraduates	Wrote essay about student named Tyrone	African American	Conscious	Lowered math performance	Assimilation
Wheeler et al. (2001), Exp. 2	Non-African American undergraduates	Wrote essay about student named Tyrone	African American	Conscious	Lowered math performance	Assimilation

Note. Parenthetical information in the stereotype column indicates that a particular component of the stereotype plausibly was activated in these experiments. Exp. = experiment; SES = socioeconomic status; MBA = master's of business administration.

^a In these experiments, both the male and female stereotypes were activated, either by explicitly describing the gender stereotypes or by mentioning performance differentials between each gender. As a result, multiple interpretations of these effects are possible; either the male or the female stereotype could have been the primary determinant of each effect. These experiments were coded with respect to the stereotype that was most focal in the experimental manipulation. In instances in which each stereotype was equally focal, the stereotype was coded as a self-stereotype.

^b In these experiments, both men and women were participants, and all participants received the manipulation. In addition, negotiation outcomes were jointly determined. As a result, it is not possible to conclusively determine the locus of the effect. Each of these experiments could be multiply categorized because either men or women could be the primary drivers of the effect. Kray et al. (2001) Experiment 1 was coded as females' assimilation to a negative self-stereotype, consistent with other stereotype threat effects that indicate that negatively stereotyped group members are primarily affected by diagnosticity manipulations. Kray et al. (2001) Experiment 3 was coded as an effect for both men and women, but it is possible that the effect was solely driven by either men or women.

Table 2
Number of Published Stereotype Activation Effects on Behavior

Direction of effect	Negative stereotypes	Positive stereotypes
Self-stereotypes		
Assimilation	15	5
Contrast	1	4
Other-stereotypes		
Assimilation	11	9
Contrast	0	4

typical of the dominant assimilation finding, young college students walked more slowly following the activation of the elderly stereotype, thereby behaving more similar to the elderly stereotype of slowness (Bargh, Chen, & Burrows, 1996). As summarized in Table 2, although most studies clearly find assimilation effects, a comprehensive treatment of the stereotype-based behavioral change literature should account for both assimilation and contrast effects that can result from the activation of positive and negative self- and other-stereotypes.

Interestingly, the literature examining the behavioral effects of stereotype activation is characterized by a salient conceptual puzzle. That is, despite apparently similar research outcomes, researchers have typically explained the impact of self- and other-stereotypes on behavior as stemming from dramatically different underlying mechanisms. As we elaborate shortly, the impact of self-stereotypes has been explained largely by one mechanism—stereotype threat, whereas the impact of other-stereotypes has been explained largely by a completely different mechanism—ideomotor theory.

Stereotype threat theory focuses primarily on the threatening feelings that are postulated to arise when negative self-stereotypes are activated (see Steele, 1997). Specifically, this theory predicts that the activation of negative self-stereotypes can lead to subsequent performance decrements on a task and that such performance decrements are mediated by overt, threat-like sensations experienced by the individual in whom the stereotype is activated. This threat might stem from a fear of confirming a negative stereotype of one's group (Steele, 1997). Thus, an elderly person might perform worse on a memory task following activation of an elderly stereotype because of the fear or anxiety associated with appearing senile to the investigator. It is important to note that the motivational approach of stereotype threat, at least as currently formulated, accounts for only one of the eight possible behavioral outcomes outlined above (i.e., assimilation to a negative, self-stereotype; see Table 2).

In contrast, ideomotor theory as applied to behavioral priming effects (e.g., Bargh, Chen, et al., 1996; Dijksterhuis, 2001), proposes that behavior follows automatically from the activation of relevant mental contents. According to this account, because stereotypes are likely to contain information about concomitant behaviors, these behaviors are more likely to be initiated when the stereotype is highly accessible. Thus, for example, activating an African American stereotype might activate the trait of *laziness*, and this could lead to the enactment of related behaviors in a testing situation (e.g., guessing and failing to read test items carefully; Wheeler, Jarvis, & Petty, 2001).

The ideomotor and stereotype threat mechanisms are quite different in that one focuses on *hot* whereas the other focuses on *cold* cognition (Abelson, 1963). The stereotype threat approach is a hot approach in that it emphasizes the feelings and motivational states

that can accompany stereotype activation. The other account, ideomotor theory, is a more cold, cognitive approach in that it emphasizes the patterns of cognitive construct activation that can alter behavior in the absence of alterations in an individual's conscious motivations and feelings (see Bargh, 1997). Conflicts between hot motivational and more cold cognitive theories have occurred in other areas of social psychology and sometimes prove difficult to resolve (e.g., see Greenwald & Ronis, 1978; Tetlock & Levi, 1982).

Although these two literatures have evolved separately, they share many parallels. Most notably, research has shown that activation of a group stereotype can have similar impacts on individuals, regardless of whether or not the stereotype refers to their own group memberships or those of someone else. Thus, activation of the African American stereotype can lead to reliable academic performance decrements in African Americans (e.g., Steele & Aronson, 1995) and also in non-African Americans (e.g., Wheeler et al., 2001). Similarly, activation of the female stereotype leads to similar academic performance decrements in men and women (Dijksterhuis & Corneille, 2000), and activation of the elderly stereotype can slow the walking speed of both the elderly and young college students (Bargh, Chen, & Burrows, 1996; Hausdorff, Levy, & Wei, 1999).

Although some parallel features have been noted recently in the literature (Dijksterhuis, 2001; Dijksterhuis & Bargh, in press), discussion of these effects has maintained the categorical distinction between these two phenomena while permitting some asymmetry in their domain of operation. Specifically, it has been suggested that self-stereotypes can also result in ideomotor effects, not just stereotype threat effects (Dijksterhuis, 2001; Dijksterhuis & Bargh, in press), and that the behavioral effects of self-stereotypes may be stronger because they provide two means of activation (i.e., the activated stereotype plus the individual's social identity; Dijksterhuis & Bargh, in press). Importantly, although these recent discussions permit cold ideomotor effects for both self- and other-stereotypes, hot mediation is hypothesized to occur only for the operation of self-stereotypes (Dijksterhuis & Corneille, 2000) if at all (Dijksterhuis & Bargh, in press). Additionally, there has been no review of the mechanisms behind motivational contrast from activated stereotypes. In the present article, we provide an extensive discussion of the operation of both hot and cold mediators and emphasize the multiple mediational paths through which stereotype activation can shape action. We highlight how both hot and cold processes might lead to assimilation and contrast following activation of both self- and other-stereotypes, and we illustrate the complex and interdependent influences of these processes.

The organization of our analysis is as follows. We first outline the basic defining characteristics and findings in both the self-stereotype and other-stereotype literatures. We highlight similarities and differences in the obtained experimental effects and in the theoretical underpinnings of each approach. Next, we discuss empirical and theoretical ambiguities in each account and propose additional theoretical alternatives. We then outline additional possible effects of stereotype activation on behavior. In concluding, we discuss potential moderators of behavioral effects, illustrate the interplay between hot and cold as well as conscious and unconscious processes, and call attention to the importance of establishing the processes underlying the observed effects.

Self-Stereotypes: A Stereotype Threat Analysis

Stereotype Threat Mechanism

Steele and Aronson (1995) published one of the most highly cited articles on the effects of self-stereotype activation on behavior. This important and provocative article showed that activation of the African American stereotype led to reduced academic performance in African American participants. To account for this effect, the notion of *stereotype threat* was introduced. Stereotype threat was defined as the pressure an individual faces when he or she may be at risk of confirming negative, self-relevant group stereotypes (Steele, 1997). According to Steele, situations that increase stereotype salience and the pressure to perform can increase stereotype threat. Furthermore, the fear of being judged as a function of a group stereotype can interfere with task performance, thereby ironically leading to a confirmation of the very stereotype the individual attempted to avoid in the first place.

Thus, when African Americans are faced with a diagnostic academic test, they will underperform relative to Caucasians and to African Americans who are told the test is not diagnostic of ability (Steele & Aronson, 1995). Presumably, facing an academic test that is diagnostic of one's ability heightens the salience of the African American stereotype of academic underperformance among African Americans. The consequent fear of confirming this negative stereotype then interferes with their performance on the test. Of importance, and in contrast to some previous models of stereotype-driven underperformance (e.g., Allport, 1954; Steele, 1990), the experience of stereotype threat does not necessitate internalization or endorsement of the negative stereotype by the stereotyped individual (see Steele, 1997). In fact, individuals most likely to experience stereotype threat (and the individuals most frequently recruited for participation in experiments in this paradigm) tend to be those whom one would expect to be least likely to endorse such negative group evaluations and those who have done a great deal to disprove the negative stereotype. For example, according to this theory, threat may be most commonly experienced among individuals who are highly identified with and successful in a given performance domain, such as academic achievement. Nevertheless, despite the individual's qualifications and previous successes in the performance domain, the lingering threat of being judged by the negative stereotype can create unusually high pressure to perform. Such pressure is hypothesized to lead to decreases in performance as a result of such performance-impairing phenomena as anxiety, evaluation apprehension, or alterations in self-efficacy.

Characteristic Features of Stereotype Threat

A number of features have been postulated to characterize stereotype threat. Because this is a relatively new literature, some features have been tested more than others. We outline these features and evaluate the data offered in support of them.

Stereotype target. Because stereotype threat concerns the fear of confirming negative stereotypes about one's own group(s), threat has been predicted to be experienced only when one is a member of a group about which negative domain-relevant stereotypes exist (Steele, 1997). In other words, according to stereotype threat theory, stereotype threat should occur only for self-stereotypes. Researchers in this area are quick to point out, how-

ever, that stereotype threat should not be limited to traditionally stigmatized groups. Instead, a member of any group targeted by negative stereotypes can show stereotype threat effects in the domains relevant to the stereotype (e.g., memory performance in the elderly or athletic performance in Caucasian men; see Table 1). Accordingly, for stereotype threat to occur, one need not experience long-term feelings of inferiority or lowered self-worth. Stereotype threat is a situationally based threat that can arise any time negative in-group stereotypes can provide potential explanations for one's poor performance (Steele, 1997).²

Stereotype applicability. Perhaps the cornerstone finding in the stereotype threat literature concerns the interaction between participants' group membership and the alleged diagnosticity of the administered test. According to a stereotype threat perspective, because stereotype threat involves the fear of being judged by a relevant group stereotype, such threat should only arise to the degree that the test performance is diagnostic of one's stereotype-relevant ability. To the extent that a test is unreliable or otherwise uninformative regarding one's abilities, threat should fail to occur. This prediction is consistent with other theory that predicts that activated constructs should influence behavior and judgment only to the extent that the activated construct is applicable to the subsequent target, situation, or behavior (e.g., Higgins, 1996). Empirical tests of this feature have been supportive. In two experiments (Steele & Aronson, 1995, Experiments 1 and 2), African American and Caucasian participants with high verbal skills were recruited to take part in an experiment examining verbal ability. Some of the participants were told that the test was very difficult and would provide an accurate measure of their verbal abilities and limitations (diagnostic condition). Other participants were told that their ability would not be evaluated and that the test was simply to better understand factors involved in solving verbal problems (nondiagnostic condition). Results indicated that performance on the test was worst among African Americans in the diagnostic condition. Similar patterns of results have been obtained by manipulating test diagnosticity and testing men and women (Quinn & Spencer, 1996, cited in Aronson, Quinn, & Spencer, 1998), individuals of high and low socioeconomic status (Croizet & Claire, 1998), and Latino students (Aronson & Salinas, 1997, cited in Aronson et al., 1998). Additionally, task diagnosticity has been found to decrease the performance of women in nonacademic testing domains (i.e., negotiation) as well (Kray, Thompson, & Galinsky, 2001).

Another manipulation of stereotype applicability concerns test difficulty. Spencer, Steele, and Quinn (1999) reasoned that test difficulty can moderate the impact of stereotype activation on behavior because difficult tests could be perceived to be more diagnostic and hence applicable to the stereotype. In one test of this effect (Spencer et al., 1999), men and women who were highly skilled at and identified with mathematics were randomly assigned to take either a difficult or easier math test on a computer. The researchers hypothesized that no gender differences should be obtained on the easier test because threat should be unlikely to

² Some work conducted by stereotype threat researchers may provide an apparent contradiction to this aspect of Steele's initial theoretical formulation (see Aronson et al., 1999; Stone et al., 1999). We discuss this seeming contradiction later in the article.

disrupt performance when participants were not highly challenged. On the difficult test, however, women should perform significantly worse than men because the stereotype provides a potential explanation for their self-experienced difficulty on the test. Results indicated a significant interaction between gender and test difficulty, and post hoc analyses revealed that the women in the difficult test condition performed significantly worse than participants in any of the other three conditions. These results are consistent with the view that test difficulty can moderate stereotype threat effects.³

Finally, stereotype applicability has been examined by varying the relevance of the task to the activated stereotype. Again, results support the notion that activated stereotypes diminish performance only when they are applicable to the task. For example, being the only woman in a group decreases performance on stereotype-relevant tasks like math ability tests but not on other tasks like verbal ability tests (Inzlicht & Ben-Zeev, 2000). Similarly, men told that men underperform on affective tasks exhibit reduced performance on subsequent affective tasks but not on unrelated tasks like lexical-decision or valence-decision tasks (Leyens, Desert, Croizet, & Darcis, 2000). Thus, there appears to be considerable support for the hypothesis that stereotype applicability moderates the impact of stereotype activation on subsequent performance.

Importance of the behavioral domain. For negative, domain-relevant stereotypes to be threatening, the individual must have some degree of self-identification with performance in that domain (Steele, 1997). Thus, an individual may experience stereotype threat to the extent that he or she has internalized the importance of academic or other achievement in a given domain and that he or she considers it relevant for his or her self-definition. To the extent that those individuals who are highly identified are also those who excel in a domain, one may see that those most susceptible to stereotype threat effects are those who are the highest achievers, who have the highest confidence in their abilities, and who have done the most to disprove the negative stereotypes associated with their group. Importantly, those who are not highly identified with the stereotype-relevant performance domain should be unlikely to show stereotype threat effects because the possibility of poor performance is not a threat to the self.

Experimental evidence supports these assertions. In one study, highly and moderately identified participants were randomly assigned to a stereotype threat or control condition (Aronson et al., 1999). After the stereotype threat manipulation, participants completed a portion of the mathematical Graduate Records Examination (GRE). Results indicated that the stereotype threat manipulation reduced performance but only among those who were highly identified with this domain. Less-identified participants actually performed better in the stereotype threat condition.

Awareness of stereotype implications. Another important factor in the experience of stereotype threat is that the individual is aware of the negative implications of the stereotype. To feel threatened, the individual must be aware that a negative stereotype is applicable to the given situation and must be cognizant of its potential pernicious consequences for the judgments of others (e.g., being judged as a function of the negative stereotype). Presumably, to the extent that one remains blissfully unaware that one might be judged by the negative stereotype or that the stereotype is applicable in that situation, one should fail to be threatened.

Participants' awareness of the implications of the stereotype has been varied by indicating that a given test typically shows group differences (e.g., by gender or by race) or not. This manipulation increases the salience of the stereotype and ensures that the participant is fully aware of its implications. In one experiment using this paradigm (Spencer et al., 1999, Experiment 2), male and female participants were told that a math test they were about to take typically showed gender differences or did not. Though the instructions did not specify the nature of the gender differences, it was assumed that participants would infer that the differences would be such that women performed more poorly. Results indicated a Gender \times Test Description interaction on performance. Women performed significantly worse when told that the test typically showed gender differences, whereas men performed slightly (though nonsignificantly) better when told that the test typically yielded gender differences. There were no manipulation checks assessing stereotype salience or awareness of stereotype implications. Nevertheless, this interaction pattern is consistent with the stereotype threat prediction that one's performance can suffer when one expects to be at a performance disadvantage.

Additionally, however, other studies have shown that explicitly dismissing the negative stereotype implications or applicability by pointing out that no group differences are found can eliminate poor performance (e.g., Broadnax, Crocker, & Spencer, 1997, cited in Aronson et al., 1998; Brown & Steele, 1999, cited in Marx, Brown, & Steele, 1999; Kray et al., 2001; Spencer et al., 1999, Experiment 3). It is possible that some level of threat exists as a default in performance situations and this threat is simply exacerbated when stereotype implications are made more explicit. However, prior research within this paradigm typically indicates no group differences unless a factor heightening stereotype threat is present. Thus, it is not clear whether or not some stereotype threat is a default experience in testing situations for members of stigmatized groups or if additional factors are typically necessary to produce sufficient threat to impair performance.

Similarly, very subtle manipulations of self-stereotype accessibility have been shown to impact later behavior. For example, some research has indicated that simply filling out demographic questionnaires is sufficient to elicit performance changes on a subsequent test (e.g., Shih, Pittinsky, & Ambady, 1999; Steele & Aronson, 1995, Experiment 4). In these experiments, the activation of the stereotype was very subtle, and it is not clear that the participants were aware of the implications of the stereotype activation for their later performance. Yet, behavioral effects were still found. Additionally, no evidence of threat-like mediation was provided in support of a stereotype threat or consciously mediated alternative. Thus, although performance decrements have been observed under conditions in which there was very low awareness

³ Of course, test difficulty could moderate the effects of stereotype threat for another, less theoretically interesting reason. That is, the effects of any independent variable should be most readily detected when the presence of ceiling and floor effects on the dependent measure is eliminated. Thus, as Spencer et al. (1999) noted, this experiment by itself does not distinguish between a stereotype-threat account and those that emphasize more chronic ability differences (e.g., Benbow & Stanley, 1980, 1983). Later experiments in the Spencer et al. (1999) article that used difficult tests, however, provide evidence that chronic ability was not responsible for the observed differences in the difficult test condition.

of the stereotype activation or its implications in the testing situation, it seems clear that heightening or lowering awareness of stereotype implications produces performance differences in the predicted direction.

Mediation by experiential phenomenology. One of the hallmark features of stereotype threat is that it is consciously experienced. Thus, writings in this paradigm (e.g., Steele, 1997) emphasize the presence of emotional distress, pressure, anxiety, evaluation apprehension, and the like, all of which strongly suggest a consciously experienced phenomenology. Indeed, the very term *stereotype threat* suggests the presence of an explicit and overt situational influence on the actors, as opposed to the myriad of more implicit or unconscious influences that can impact behavior (e.g., Greenwald & Banaji, 1995). Consistent with this view, the stereotype threat literature has tested a number of potential mediators of self-stereotype behavior effects that reflect the conceptualization of stereotype threat as a consciously experienced, negative state. To date, however, reliable mediational evidence has been elusive. Some experiments have been designed explicitly to measure the internal states that result from stereotype activation. For example, Steele and Aronson (1995, Experiment 3) found that African Americans who expected to take an ability diagnostic test made more self-doubt-related word-fragment completions, distanced themselves from the African American stereotype, and showed a decreased willingness to indicate their race on a demographic questionnaire. Stangor, Carr, and Kiang (1998) showed that when women expected to take a gender-biased test, their preexisting confidence was undermined. Unfortunately, participants in these two experiments never actually took part in the second performance task, and so a true test of the mediational hypothesis with these data was not possible. That is, just because threatening situations increase one's self-doubt or undermine one's confidence, it does not necessarily mean that such variables actually mediate the impact of primed stereotypes on performance. It is possible that the lowered performance and the measured self-report variables like self-doubt are both simply consequences of the stereotype activation with no mediation taking place.

Other experiments have tested mediation more fully. A large number of potential mediators has been measured, including the presence of distracting thoughts (Aronson et al., 1999; Cheryan & Bodenhausen, 2000; Steele & Aronson, 1995), perceptions of test bias (Steele & Aronson, 1995), thoughts concerning academic performance and self-worth (Steele & Aronson, 1995), state anxiety (Aronson et al., 1999; Spencer et al., 1999; Steele & Aronson, 1995; Stone, Lynch, Sjomeling, & Darley, 1999), frustration (Steele & Aronson, 1995), persistence (Steele & Aronson, 1995), guessing (Shih et al., 1999; Steele & Aronson, 1995), time allocation (Spencer et al., 1999; Steele & Aronson, 1995, 1998), self-handicapping (Croizet & Claire, 1998; Steele & Aronson, 1995; Stone et al., 1999), effort (Aronson et al., 1999; Steele & Aronson, 1995; Stone et al., 1999), perceived difficulty (Aronson et al., 1999; Kray et al., 2001), perceived pressure or evaluation apprehension (Aronson et al., 1999; Spencer et al., 1999), confidence (Aronson et al., 1999; Kray et al., 2001), and self-efficacy, performance expectancies, or self-perceptions of skills (Kray et al., 2001; Shih et al., 1999; Spencer et al., 1999; Steele & Aronson, 1995; Stone et al., 1999).

Searches for mediators have yielded null or inconsistent effects for all of these variables. The tests for frustration, thoughts con-

cerning academic performance and self-worth, persistence, effort, perceived difficulty, confidence, and self-efficacy have all yielded null or reversed effects (Aronson et al., 1999; Spencer et al., 1999; Stangor et al., 1998; Steele & Aronson, 1995; Stone et al., 1999). Tests of other variables such as anxiety, distraction, time allocation, performance expectancies, evaluation apprehension, guessing, and self-handicapping have yielded more mixed results (Aronson et al., 1999; Cheryan & Bodenhausen, 2000; Croizet & Claire, 1998; Spencer et al., 1999; Steele & Aronson, 1995; Stone et al., 1999). Some researchers in this area seem to prefer an anxiety explanation (e.g., Spencer et al., 1999), but the evidence for anxiety-based mediation is not strong. Of the studies testing anxiety mediation, only one (Spencer et al., 1999, Experiment 3) has included data indicating that anxiety reliably correlates with performance, and no studies have shown significant anxiety mediation. Because there are a very limited number of published studies that test for anxiety mediation, more research is necessary before a definitive position can be taken on this issue.

Direction of effect. A last feature of stereotype threat is that it should be associated with unidirectional effects. That is, stereotype threat should lead to performance decrements, not performance improvements as a result of stereotype salience (Steele, 1997). In fact, in nearly all of the published literature on stereotype threat to date, those individuals who had a negative self-stereotype activated performed worse than those individuals who did not (e.g., Aronson et al., 1999; Brown & Josephs, 1999; Croizet & Claire, 1998; Shih et al., 1999; Spencer et al., 1999; Steele & Aronson, 1995; Stone et al., 1999). However, as Table 2 indicates, there are some self-stereotype effects that reflect improved performance following positive self-stereotype activation. The relatively implicit means of activating the positive stereotypes in most of these studies and the subsequent improvement in performance might suggest that the observed behavioral changes are unlikely to be the result of stereotype threat and are not interpreted as such by the authors (Hausdorff et al., 1999; Levy, 1996; Shih et al., 1999). On the other hand, as described in more detail later, we suggest that it is indeed possible that positive self-stereotypes produce positive behavioral consequences not necessarily by an ideomotor mechanism but by a mechanism that is the motivational complement of stereotype threat. That is, activation of positive self-stereotypes might induce stereotype affirmation or a stereotype halo that boosts confidence and task motivation (or reduces threat), thereby enhancing performance (e.g., Kray et al., 2001).

Other-Stereotypes: An Ideomotor Analysis

Whereas stereotype threat has been the primary explanatory mechanism applied to self-stereotype effects, ideomotor theory has been the primary explanatory mechanism applied to other-stereotype effects. Though the effects themselves are similar, ideomotor theory provides a very different mechanism for the findings. Most notably absent from this alternative account is the necessity of threat-like sensations postulated to mediate stereotype threat. Instead, the ideomotor account emphasizes a more cognitive approach. In addition, these explanations more easily apply to broader behavioral effects than performance decrements.

The Ideomotor Mechanism

Prior research has clearly and repeatedly demonstrated that the accessibility of mental representations can impact social perception and judgment whether or not the activated mental contents are self-relevant (e.g., Carver, Ganellan, Froming, & Chambers, 1983; Herr, 1986; Higgins, Rholes, & Jones, 1977; Srull & Wyer, 1979). An ideomotor perspective proposes that self- or other-stereotypes can impact not only judgment and perception but also overt behavior as a result of making mental contents differentially accessible.

Carpenter (1874) was the first to coin the term *ideomotor action*. He proposed that when conscious ideation reaches a certain intensity, actions can follow directly without necessitation of the will. Hence, ideation can lead to action as a simple "reflex action of the Cerebrum" (p. 279), and the role of the will is not to initiate action but instead to simply permit a movement to occur. In support of this reasoning, Carpenter reviewed a host of mystical phenomena such as table-talking (in which tables spin and tap answers to questions seemingly on their own accord), St. Vitus's dance (in which individuals dance and spin without the experience of volition), and the action of divining rods and pendulums (in which rods and pendulums held by an individual appear to autonomously indicate information such as the composition of a substance placed beneath it). In all of these phenomena, he suggested, the expectations or thoughts of the participating individuals were sufficient to create the resulting action. In fact, these types of motor phenomena can occur even in the presence of an explicit intention not to act on one's expectation (Carpenter, 1874; Hull, 1933/1961; Wegner, Ansfield, & Pilloff, 1998).

For example, one occult phenomenon reviewed by Carpenter involves a pendulum that is held between the thumb and forefinger of the participant. Through no deliberate or apparent movement of the participant, the pendulum can oscillate to indicate the time, provide answers to questions, or reveal the composition of substances. Subsequent research, of course, demonstrated that the pendulum's movement was not magically driven by its innate intelligence but instead by the expectation of the participant (Chevrue, 1833, cited in Carpenter, 1874). The nature of the pendulum's swing is affected by things such as visual or auditory pulses, visual access to the pendulum's movement, and most importantly, the expectations of the participant regarding how the pendulum should move (e.g., Carpenter, 1874; Easton & Shor, 1975, 1976, 1977). In line with Carpenter's analysis, the expectant attention of the individual is sufficient to initiate the movement, even in the absence of experienced volition.

The idea of ideomotor action was removed from the realm of the occult and further popularized by William James (1890/1950), who suggested that thought, by its very nature, is impulsive. According to James, all actions follow directly from thought, and the act of the will is simply to direct one's thoughts toward one type of action or its antagonist. As James strongly asserted, "To attend to [an action] is the volitional act, and the only inward volitional act which we ever perform" (p. 819).

More recent research and theory has supported the notion that perception, thought, and action share high similarity in mental representation and function. Some theorists have proposed that perception and action are strongly associated in memory because of their high level of semantic overlap (e.g., Lashley, 1951; Prinz,

1987, 1990), and research indicates that observing someone engage in an action leads to an increased propensity to enact that behavior oneself (see Bargh & Ferguson, 2000; Dijksterhuis & Bargh, in press, for reviews). Similarly, viewing exemplars engage in an action or receiving direct suggestions from others can result in the same types of behavioral execution that imagining an event or engaging in autosuggestion produces (Hull, 1933/1961). In fact, action-oriented thought and action itself appear to share similarities at the physical level. For example, brain imaging techniques have revealed that similar patterns of brain activity result when one engages in an action or simply imagines oneself doing so (e.g., Roland, Larsen, Larsen, & Skinhoj, 1980; see Dijksterhuis & Bargh, in press, for a review), and imagining an action or event can lead to sensations and muscular contractions that mimic those that would result if the action or event occurred (e.g., Arnold, 1946).

Research has likewise shown that experimental primes impact behavior similarly under both more conscious and subliminal priming conditions. For example, deliberate construction of a story about an African American can lead to stereotype-consistent behavior (Wheeler et al., 2001), but so too can subliminal exposure to African American faces (Bargh et al., 1996). In fact, with few exceptions, subliminal and more conscious other-stereotype activation has the same effect—namely, increasing the likelihood of stereotype-consistent behavior (see Table 1). Similarly, increased stereotype activation appears to have the same effect regardless of whether the stereotype contents were self-generated (Dijksterhuis & Van Knippenberg, 1998; Wheeler et al., 2001) or passively received (Dijksterhuis & Corneille, 2000).

Though the classic ideomotor phenomena reviewed by Carpenter (1874) and James (1890/1950) all involved the direct activation of the behavioral representation (either by internal or external means), research indicates that behavioral change can also follow the initial activation of nonbehavioral constructs. Specifically, in a series of influential and sometimes startling experiments conducted mostly by Bargh, Dijksterhuis, and their colleagues, the mere activation of social stereotypes has been shown to lead to behavioral change (e.g., Bargh et al., 1996; Dijksterhuis & Van Knippenberg, 1998). Such behavioral change has been postulated to occur as the result of the associative linkages between the stereotypes and the behaviors they imply (e.g., Bargh et al., 1996; Dijksterhuis, 2001). According to this account, the activation of a stereotype, either directly or via exposure to a member of the stereotyped group, leads to activation of trait-related behaviors. Once activated, these behavioral representations find fruition in actual behavior much like behavioral representations that are activated as the result of direct behavioral perception or conscious ideation. Recent research is consistent with this association-based account. For example, memory deficits following activation of the elderly stereotype occur only for those who associate stereotypic traits with the elderly (Dijksterhuis, Aarts, Bargh, & Van Knippenberg, 2000), and test performance deficits following a female stereotype prime occur only to the extent that one associates stereotypic attributes with women (Dijksterhuis & Corneille, 2000).

Although many examples of ideomotor effects involve simple motor movements (e.g., swinging a pendulum), more complex behaviors can also result from similar mechanisms. As skilled behaviors are acquired, they become grouped together in the form of behavioral scripts (Abelson, 1976; Schanck & Abelson, 1977)

or sequences of actions that can be performed without necessitating conscious awareness (Jastrow, 1906). As a result, even extremely complex behaviors like driving can be executed largely without awareness when they are well learned (see Wegner & Bargh, 1998, for a review).

Numerous models have been proposed to account for the automatic execution of complex behaviors. Some models of action initiation propose that complex action sequences are initiated globally but enacted or continued locally (e.g., Baars, 1992; Kirsch & Lynn, 1997; Norman, 1981; Norman & Shallice, 1986). Hence, the activation of an action (e.g., eat) may activate a parent schema (Norman, 1981) that results in the concomitant activation of more specific behavioral schemas that regulate the subprocesses necessary for completion of the action (e.g., walking to the kitchen, opening the refrigerator, etc.). These smaller units of action can be instigated automatically by external events and regulated by the schema hierarchy without awareness so that very flexible and novel behavioral patterns can emerge (Kirsch & Lynn, 1997). Once set in motion, the entire behavioral sequence can occur without attention or awareness, until critical choice points necessitate conscious intrusion (Jastrow, 1906; Norman, 1981). Some have speculated that the need for such conscious intrusions is somewhat rare, and one may live out much of one's life in a mindless series of automatic behaviors (Langer, 1978). Ideomotor behavior may therefore not be a rare or unusual phenomenon but instead comprise the bulk of one's actions (James, 1890/1950).

As is apparent from this discussion, the ideomotor perspective provides a very different account for the impact of stereotype activation on behavior. Instead of being driven by hot motivational factors such as anxiety or evaluation apprehension, the behavioral outcomes attributed to stereotype threat might result simply from the increased accessibility of stereotype-relevant behavioral schemas. Such schemas, once activated, could operate without one's awareness or intention. The available studies, summarized in Table 1, clearly suggest that priming other-stereotypes can lead to the same types of behavioral changes that have been associated with priming self-stereotypes. Although most of the research using the ideomotor conceptualization has been conducted using other-stereotypes, the ideomotor perspective suggests that both self- and other-stereotypes could have a nonconscious impact on overt behavior that results from patterns of mental activation. The data thus far are supportive of this view (e.g., Bargh et al., 1996; Dijksterhuis & Corneille, 2000; Hausdorff et al., 1999; but see Levy, 1996). Thus, it seems possible that activation of self-relevant African American, female, or elderly stereotypes could lead to performance decrements by increasing feelings of threat, anxiety, and evaluation apprehension, but it might also lead to performance decrements more directly via ideomotor processes (Dijksterhuis & Corneille, 2000).

Similarities and Differences From Stereotype Threat

Below, we note some similarities and differences between the self-stereotyping research guided by stereotype threat theory and the other-stereotyping research guided by ideomotor theory.

The basic other-stereotype priming finding. The behavioral effects of priming other-stereotypes bear great resemblance to the behavioral effects of priming self-stereotypes. For example, in one experiment in which other-stereotypes were primed (Dijksterhuis

& Van Knippenberg, 1998), undergraduate college students were instructed to write about the attributes and lifestyle of either professors or soccer hooligans for a 5-min period, thereby activating the stereotypes of these groups. Two additional groups were primed with the traits corresponding to professors or soccer hooligans (i.e., *intelligent* or *stupid*). After the priming manipulation, participants proceeded to a 20-item multiple-choice test that was composed of questions adapted from the game Trivial Pursuit. Results indicated that participants' behavior conformed to that implied by the prime. Participants primed with the trait *intelligent* answered more questions correctly than participants primed with the trait *stupid*. Similarly, participants who wrote about the attributes of a typical professor answered significantly more questions correctly than participants who wrote about the attributes of a soccer hooligan. More closely aligned with the dominant paradigm in stereotype threat research, reliable performance decreases have also been shown following subtle activation of the African American stereotype in a group of non-African American participants. For example, in two experiments (Wheeler et al., 2001), participants were instructed to write an essay about a day in the life of either a student named Tyrone Walker or Eric Walker. These two essay topics were designed to activate the African American stereotype or not, respectively. Following the essay task, in a supposedly unrelated activity, participants completed a portion of the mathematical section of the GRE. In both studies results indicated that the non-African American participants who wrote about Tyrone Walker performed significantly worse than participants who wrote about Eric Walker, consistent with the stereotype of African Americans as academic underachievers.

One account of these results, the ideomotor perspective, proposes that the act of writing about the members of these different social groups results in the activation of the group's stereotype-related traits and stereotype-relevant behaviors. At first glance, it would seem difficult to construct an alternative explanation using the stereotype threat framework because the participants in these experiments were not members of the stereotyped groups. That is, it would seem unlikely that non-African American participants would perform worse as a result of fear of confirming an African American stereotype. But, as we describe in detail later, motivational accounts are possible for these results.

Awareness of stereotype activation. In contrast to the stereotype threat research, the bulk of research examining other-stereotypes has not used paradigms in which the target individual was likely to be aware of the activation of the stereotype or its implications. Indeed, much work guided by the ideomotor approach has taken advantage of priming methods such as sentence unscrambling tasks or subliminal priming techniques that presumably leave participants unaware that a stereotype or trait concept has been activated (Bargh et al., 1996; Carver et al., 1983; Dijksterhuis & Corneille, 2000). Furthermore, participants in these experiments do not suspect that the priming task will have any influence on their behavior or performance (e.g., Dijksterhuis & Van Knippenberg, 1998; Dijksterhuis et al., 1998; Wheeler et al., 2001).

Stereotype target. Perhaps a defining distinction between stereotype threat and ideomotor accounts arises from the degree to which the activated stereotype must be a self-stereotype. As noted earlier, although the stereotype threat paradigm does not require that an individual be a member of a stigmatized group or endorse

the stereotype, it does require that the activated stereotype be a self-stereotype with negative implications (Steele, 1997). In contrast, the ideomotor perspective does not require that the activated stereotype be a self-stereotype. Because the automatic behavior is simply the result of activated memorial contents, it follows that anyone with such stored representations potentially could be susceptible to behavioral priming from any stereotype, as long as they were cognizant of the stereotype. Accordingly, any individual who has knowledge concerning the stereotype of African American academic underachievement should be able to be influenced by activation of the African American stereotype, regardless of whether or not he or she is a member of that social category. Consistent with this view, numerous experiments have demonstrated that individuals can be led to act in ways consistent with activated stereotypes, even though they are not members of the groups to which the stereotypes apply (see Table 1).

Stereotype applicability. Like the stereotype threat approach, the ideomotor approach makes the prediction that stereotype activation should lead to behavioral changes only when the stereotype is applicable to the behavioral domain. Consistent with prior theory on construct activation (Higgins, 1996), an ideomotor perspective would predict greater behavioral changes when the behavioral domain is related to the traits implied by the stereotype. Therefore, in the academic performance domain, this approach would predict performance decrements primarily when the test is presented as a diagnostic test of ability (i.e., is relevant to the stereotype). And, as noted earlier, to the extent that more difficult tests are perceived to be more diagnostic, and hence applicable to the stereotype, one would expect test difficulty to moderate ideomotor effects as well. Thus, both the ideomotor and stereotype threat paradigms make the same predictions for moderation of the stereotype prime by test diagnosticity and difficulty in the performance domain, and by stereotype applicability more generally.

Importance of the behavioral domain. A stereotype threat perspective holds that behavioral changes following stereotype activation should occur primarily among individuals who are identified with the behavioral domain (as there is no threat without identification). In contrast, an ideomotor perspective might predict that the individual's level of domain identification by itself should make no difference. Because the link between perception (here, stereotype activation) and action is posited to be relatively unmediated, behavioral changes should be determined primarily by the strength of the link between the percept and the related behavioral representation, not one's level of personal identification (see Bargh, 1997).

An ideomotor perspective could predict behavior moderation by identity, however, to the extent that highly identified individuals had domain-relevant stereotypes more chronically accessible, and hence, capable of activation (see Bargh, Bond, Lombardi, & Tota, 1986). Behavioral priming research has demonstrated that the magnitude of the priming effect is dependent on the extent to which the stereotype is linked with the social category prime. For example, individuals primed with the elderly stereotype exhibit memory deficits only to the extent that they associate the elderly with forgetfulness (Dijksterhuis et al., 2000; see also Dijksterhuis & Corneille, 2000).

Absent chronic stereotype accessibility differences, however, the ideomotor perspective provides little theoretical reason to expect that level of domain identification would moderate the

effect of the prime on behavior, though a number of potential relationships are plausible. In automatic behavior studies examining the impact of other-stereotype activation on academic performance, for example, participants were not selected on the basis of their level of identification with academics, suggesting that the effects are at least strong enough to manifest themselves even when low identification individuals are a part of the sample (Dijksterhuis & Van Knippenberg, 1998; Dijksterhuis et al., 1998; Wheeler et al., 2001). It is interesting that stereotype threat effects have likewise proven strong enough to hold in samples not preselected for domain identification (e.g., Croizet & Claire, 1998; Shih et al., 1999; Spencer et al., 1999, Experiment 3; Steele & Aronson, 1995). Further research is necessary to determine whether or not identification levels moderate the effects of other-stereotypes on behavior and if such moderation is mediated by differential stereotype accessibility.

Awareness of stereotype implications. Stereotype threat requires that the individual in whom the stereotype is activated perceives the applicability and relevance of the stereotype in possibly explaining his or her subsequent behavior. The ideomotor account, on the other hand, requires no such recognition. In prior experiments, participants primed with the stereotype either had little awareness of the stereotype activation (Bargh et al., 1996; Dijksterhuis & Corneille, 2000) or at least perceived no connection between the stereotype priming phase and their later behavior (Dijksterhuis et al., 1998; Dijksterhuis & Van Knippenberg, 1998). The fact that participants perceived no connection between the priming task and their subsequent behavior is evidence that they did not perceive any consequences of the stereotype activation on their own behavior.

Direction of effect. As the name stereotype threat implies, threat effects are proposed to be unidirectional (i.e., assimilation to a negative stereotype). An ideomotor perspective, on the other hand, suggests that behavior following a stereotype prime can resemble that implied by either positive or negative stereotypes. Hence, people perform worse than control participants when primed with the stereotype of soccer hooligans (thereby exhibiting assimilation to a negative stereotype) but perform better than control participants when primed with the stereotype of professors (thereby exhibiting assimilation to a positive stereotype; Dijksterhuis et al., 1998; Dijksterhuis & Van Knippenberg, 1998). Similarly, priming participants with the concept of trait helpfulness can lead to more helpful behavior (Macrae & Johnston, 1998).

Mediation. A final component of the ideomotor perspective is the lack of proposed motivational mediators for behavioral effects. Because ideomotor effects are supposed to be the result of relatively cold cognitive processes involving the selective activation of a subset of mental contents, hot mediators such as evaluation apprehension, anxiety, self-efficacy beliefs, and the like should be absent. In its purest form, this perspective makes the prediction that changes in behavioral output should occur as a result of the direct activation of behavioral representations (perhaps mediated by the activation of stereotype-relevant traits; see Bargh, 1997; Dijksterhuis, 2001) relevant to the semantic content of the stereotype. For example, priming the African American stereotype of underachievement could operate via activation of behavioral representations associated with the lazy trait (e.g., simply guessing on a test). According to this perspective, what should be absent is the hot ego involvement and fear of appearing negatively or stereotypically to oneself or others. Instead, behav-

iors would result simply and mechanically as the result of the differential activation of mental contents.

Making Distinctions Between Stereotype Threat and Ideomotor Effects

As our review and Table 1 have illustrated, there is a striking similarity between the research conducted by stereotype threat researchers on self-stereotypes and that conducted by ideomotor researchers on other-stereotypes. Both lines of research have shown that the activation of stereotypes can influence later behavior, typically in an assimilative fashion, and these approaches make similar predictions for many behavioral outcomes. However, although there has been some recognition of the fact that the self-stereotype studies might be accounted for by more cognitive processes such as ideomotor mechanisms (Dijksterhuis & Bargh, in press; Wheeler et al., 2001), there has been little recognition that the other-stereotype studies might be accounted for by more motivational mechanisms such as those specified by stereotype threat theory. Although stereotype threat and ideomotor studies might appear to be readily distinguishable, differentiating between each mechanism may not always be as clear-cut as much of the current literature seems to imply.

In this section, we begin by reviewing how both the ideomotor and motivational accounts can explain assimilation to both positive and negative self- and other-stereotypes. We then discuss additional mechanisms that might also provide plausible accounts of these assimilative processes. Last, we expand each account to accommodate contrast effects that have emerged in the literature.

Ideomotor Mechanisms Can Account for Self-Stereotype Findings

Though most of the work on ideomotor effects has invoked other-stereotypes, there is little theoretical reason to believe that ideomotor mechanisms could not also operate when self-stereotypes are activated. As noted previously, anyone with the relevant, stored memorial constructs (i.e., stereotypes and related traits and behaviors) should be equally susceptible to ideomotor effects. In fact, some recent work supports these assertions. For example, Dijksterhuis and Corneille (2000) reported that subliminally priming the female stereotype has identical effects on the subsequent math performance of men and women (i.e., reduced performance). Similarly, Hausdorff et al. (1999) have shown that subliminal presentation of negative elderly stereotype contents to the elderly can slow walking speed, just as was shown for college students primed with the elderly stereotype (Bargh et al., 1996).

It is not possible to establish conclusively which process was responsible for the operation of the self-stereotypes in these experiments. For example, the subliminal self-stereotype activation in these studies could have produced changes in perception of the self or of the environment that subsequently created feelings of anxiety or evaluation apprehension. Nevertheless, ideomotor theory can offer a plausible account—the self-stereotype may simply have activated stereotype-relevant behavioral representations like walking slowly or failing to concentrate that produced the observed behavior (see Dijksterhuis, 2001).

In addition, some research interpreted as supporting stereotype threat is amenable to an ideomotor explanation. For example, in one experiment, African Americans who indicated their race on a demographic questionnaire prior to completing a test of academic skill performed worse than African Americans who did not complete the questionnaire (Steele & Aronson, 1995, Experiment 4). It is not clear that the subtle stereotype activation procedure used in this experiment would be sufficient to elicit a significantly increased fear of confirming the stereotype over those not completing the questionnaire, as required for stereotype threat. Furthermore, measured mediational variables in this study failed to support a threat explanation. Thus, an ideomotor perspective can offer an alternative explanation for these data. The ideomotor perspective too would predict that performance should be worst in the only cell in which the negative stereotype was activated (i.e., when African Americans indicated their race).

Similarly, ideomotor theory can provide a possible explanation for the stereotype threat work on stereotype applicability (e.g., Croizet & Claire, 1998; Spencer et al., 1999; Steele & Aronson, 1995, Experiments 1 and 2). In general, an ideomotor account would suggest that behavioral changes should be stronger any time there are situational factors that heighten the activation and application of the stereotype (see e.g., Banaji, Hardin, & Rothman, 1993; Hardin & Rothman, 1997; Higgins, 1996). One might expect that stereotyped group members have domain-relevant stereotypes chronically accessible but that factors increasing applicability (e.g., telling participants that a test typically shows gender differences) or decreasing stereotype applicability (e.g., stating that no gender differences are typically found) would increase or decrease performance differences accordingly. Alternately, the applicability manipulations may have worked for another reason. Informing participants that a test typically shows gender or race differences might heighten the accessibility of the stereotype and therefore increase the likelihood of ideomotor effects. Telling participants that a test shows no gender or race differences, on the other hand, could make some alternate mental contents more likely to predominate, reducing the effect of the stereotype.

Last, ideomotor theory can account for situations in which multiple self-stereotypes are applicable to a behavior. Subtly increasing or decreasing the salience of self-stereotypes can influence the stereotype to which behaviors are assimilated. According to an ideomotor account, the behaviors that are enacted should depend on the relative levels of accessibility of the competing stereotypes. For example, the test performance of Asian American women can improve or worsen depending on whether situational factors make the Asian or female aspects of their self-identities salient (Shih et al., 1999). The performance changes could occur without necessitating stereotype threat mechanisms. In fact, given the subtle nature of stereotype activation in this research, ideomotor mechanisms may have been more likely. Thus, situational factors would be expected to alter ideomotor effects by altering both stereotype accessibility and stereotype applicability.

Motivational Mechanisms Can Account for Other-Stereotype Findings and Assimilation to Positive Stereotypes

Just as ideomotor theory might plausibly account for many effects attributed previously to stereotype threat, an expanded motivational account using stereotype-threat-like mechanisms might explain a number of additional cells in Table 2 that are not currently captured by stereotype threat theory. For example, stereotype threat proposes performance decreasing effects of self-stereotype activation only. However, assimilation to positive stereotypes and to other-stereotypes might also be explained by motivational factors.

As Table 2 indicates, some research has demonstrated that activation of positive self-stereotypes can lead to subsequent behavior that resembles that stereotype. Recall that Shih et al. (1999) showed that Asian women primed with the Asian self-stereotype performed better on a subsequent math test (see also, Hausdorff et al., 1999; Levy, 1996; Walsh, Hickey, & Duffy, 1999). Although the mechanism behind the performance improvement in these studies is unclear, there is little reason to suspect that consciously considered positive stereotypes could not change behavior via motivational mechanisms much like consciously considered negative stereotypes do.

Some support for this reasoning comes from research investigating the impact of reading about superstars or very successful others on one's own self-views. Such work has indicated that exposure to superstars can enhance individuals' self-evaluations and serve as a source of inspiration if the superstar is seen as relevant and his or her status is perceived to be attainable (Lockwood & Kunda, 1997, 1999). Although the work on superstars used self-category exemplars rather than stereotypes, it seems plausible that positive self-stereotypes might act in much the same way. Insofar as the behavior implied by the positive stereotype is relevant to one's personal identity and perceived to be attainable (i.e., is a possible self; Markus & Nurius, 1986), it might serve as a source of additional task motivation and inspiration.

Some evidence consistent with this type of effect has been provided in the domain of negotiation (Kray et al., 2001). In one study (Kray et al., 2001, Experiment 2), either men or women were presented with the stereotype that assertive, rational, and self-interested negotiators perform better than those who do not have such qualities. This stereotype conforms to the stereotype of male negotiation superiority, though gender was not explicitly mentioned in the manipulation. Results suggested that in a mixed-dyad negotiation task, men primed with the positive self-stereotype of high performance performed better than those not so primed. Furthermore, ancillary measures suggested that these same men experienced increased confidence during the negotiation task, relative to men who did not have the stereotype activated. Thus, there is some suggestive evidence that this outcome was not driven solely by ideomotor mechanisms. However, no mediational analyses were conducted, and it is possible that changes in confidence were the result, and not the cause, of the improved performance.

Motivation-based assimilation to other-stereotypes also seems possible. Such effects are possible, in part, because every stereotype has both direct and indirect implications (Aronson et al., 1999). The direct implications of the stereotype refer to the behaviors and traits that constitute the stereotype. For example, direct implications of the elderly stereotype are senility and slowness;

direct implications of the African American stereotype are hostility and underachievement; and direct implications of the professor stereotype are intelligence and absent-mindedness. Indirect implications, on the other hand, are those that stem from considering oneself in relation to the stereotype. For example, the indirect implication of the Asian stereotype for Caucasians is that Caucasians are unintelligent. When other-stereotypes lead to self-comparison, any stereotype may become self-relevant, regardless of whether or not its content refers to one's own social category memberships. Consequently, apparent motivational assimilation to other-stereotypes could be observed. For example, activation and consideration of the positive stereotype of Asian math skill could lead Caucasians to perform better through their efforts to disprove the stereotype of their relative inferiority (at least when ego involvement does not undermine the effect; Aronson et al., 1999). These effects should be particularly likely when the situation is perceived as a challenge (Steele & Aronson, 1995). It is important to note that if such an effect were to occur, Caucasians would not be performing better because of any direct behavioral linkage between the Asian stereotype of good performance and some relevant action (ideomotor effect) but because of indirect activation of the notion that Caucasians do not perform as well as Asians, and the subsequent motivation to disconfirm this negative expectation for one's racial group.

Some evidence for this type of effect is provided by the finding that when women are told that male characteristics (e.g., assertiveness) lead to higher performance in a negotiation task, they achieve superior negotiation outcomes compared with situations in which no stereotype is mentioned (Kray et al., 2001, Experiment 4) or in which gender is not mentioned explicitly along with the stereotype (Kray et al., 2001, Experiment 3). One explanation for this result is that women explicitly told that they are at a relative disadvantage deliberately attempt to act contrary to the stereotype in an attempt to avoid the negative implications of the positive other-stereotype. Some evidence suggestive of this type of mechanism is that the explicit mention of gender differences led to opening offers and perceptions of power that favored the women negotiators relative to situations in which gender differences were not explicitly mentioned (Kray et al., 2001). That is, women acted at the beginning of the negotiations as if they had more confidence. Though this finding is consistent with a reactance account, other accounts are also possible. The women in this experiment could have altered their behavior via ideomotor mechanisms, or the male stereotype could have improved the women's performance by acting as a high performance standard (e.g., Mussweiler & Strack, 2000). Methodological factors further obscure interpretation of this experiment. Both males and females received the male and female components of the negotiation stereotype, and all outcomes were jointly determined. As a result, it is possible that the primary driver of the effect was the men, who may have reduced their performance as the result of some sort of "choking" mechanism (Kray et al., 2001). Thus, though many different interpretations of this effect are possible, reactance on the part of women seems to be a plausible, if only partial, cause of the effect.

Just as a positive other stereotype might lead people to redouble their efforts to avoid the negative implications for the self, negative other stereotypes might lead to self-anxiety that could impair performance. For example, activation and consideration of the negative female stereotype of math underperformance could lead men to try harder but choke and perform worse (see Baumeister &

Showers, 1986). Again, if such an effect were to occur, men would not be performing worse because of any direct behavioral linkage between the female stereotype of poor math performance and some relevant action but because of indirect activation of the notion that men should perform better than women at math and the subsequent anxiety invoked by fear of disconfirming this positive expectation for one's gender. We discuss these types of ironic performance effects further in the assimilation versus contrast section below. The key point is that depending on the individual's psychological construal of the stereotype and the behavioral situation, indirect stereotype implications could lead to apparent assimilation to both positive and negative other-stereotypes for hot motivational reasons.

Although the effects described above expand the motivational account to cover the additional assimilation effects contained in Table 2, such accounts would appear to provide implausible explanations for some of the ideomotor experiments using very subtle or subliminal stereotype activation methodology. To be explicitly motivated or threatened by an other-stereotype, for example, one presumably needs to have some awareness of the stereotype and its implications for one's own performance in that setting. However, even subliminal or very subtle means of stereotype activation could lead to motivationally mediated behavioral changes. We elaborate on these possibilities in some of the additional accounts for behavioral priming effects outlined next.

Other Possible Mechanisms for Behavioral Priming Effects

Because of the mediational ambiguity concerning the stereotype threat and ideomotor accounts of behavioral priming effects, a number of plausible alternate explanations for these effects should be considered. Some less plausible alternatives can be dismissed with reasonable confidence, but several other alternatives remain. We discuss the more dismissible alternatives first.

Mood. Stereotype threat theory postulates that negative affect like anxiety can mediate the effects of self-stereotype activation on performance. Additionally, it is possible that a more general affect like mood, unrelated to performance concerns, could play a role in mediating the more implicit effects observed from subtle activation of other-stereotypes. That is, mood might provide an alternative explanation for the results of some experiments explained by ideomotor theory.

Research has shown that mood states can have significant impacts on social judgment and decision making (see Forgas, 1995; Petty, Fabrigar, & Wegener, in press; for reviews). Though mood was dismissed as an alternative explanation in some of the earlier work on ideomotor effects (Bargh et al., 1996, Experiment 2), it appears to provide a plausible account for some ideomotor findings.⁴ This is because many experiments were designed with priming effects that would be congruent with the direction of possible confounding mood effects. For example, it is not unreasonable to expect that priming participants with rude behaviors or with the elderly stereotype (Bargh et al., 1996; Hausdorff et al., 1999; Levy, 1996) could lead to negative affect. This negative affect, in turn, could be expected to make participants interrupt an experimenter more quickly, perform worse on a memory task, or walk more slowly down the hall.

Mood may likewise provide a reasonable alternative explanation for experiments examining stereotypes and performance as well. It is plausible that activation of the African American stereotype or the soccer hooligan stereotype might lead to negative affect. This negative affect could lead to negative impacts on test performance, much like priming trait-related behaviors would.

The mood account becomes less tenable as a global mediator of all stereotype priming effects, however, when viewed in the context of previous research on mood and cognition. Although the precise mechanisms differ, most mood models predict increased cognitive processing under mild negative moods relative to positive moods, at least if the task is not a very positive one (e.g., Mackie & Worth, 1991; Wegener, Petty, & Smith, 1995). For example, the feelings-as-information perspective (see Schwarz, Bless, & Bohner, 1991) predicts that positive moods will interfere with information processing, whereas negative moods encourage it. According to this view, emotional mood states serve as signals about the surrounding environment. That is, positive moods indicate that little information processing is necessary because all is well, whereas negative moods signal that more information processing is necessary because there is potentially something wrong with the surrounding environment. Thus, if it is true that activation of negative group stereotypes produces negative moods, one would expect that participants primed with such stereotypes would perform better than participants not so primed, at least to the extent that greater information processing leads to higher test performance.

Finally, the mood explanation seems less defensible given that automatic behavior experiments have shown the same decreased academic performance effects with stimuli likely to elicit both negative and positive moods. Thus, in experiments examining the effects of stereotype primes on cognitive tasks, results have produced performance decrements for primes suggesting decreased cognitive abilities, regardless of whether those primes might be more likely to engage negative affect (i.e., soccer hooligans, Dijksterhuis & Van Knippenberg, 1998) or positive affect (i.e., supermodels, Dijksterhuis et al., 1998). Taken together, the mood explanation would appear to have difficulty accounting for the diversity of behavioral priming effects obtained thus far.

Automatic activation of approach or avoidance states. In addition to the impact that stereotype activation could have on participants' moods, stereotype activation might impact behavior via automatic evaluation (Bargh, 1997). Activation of a negative stereotype, for example, could elicit negative evaluations of the stereotyped group, either consciously or automatically (see Bargh, Chaiken, Govender, & Pratto, 1992; Bargh, Chaiken, Raymond, & Hymes, 1996; see also Fazio, 1993; Fazio, Sanbonmatsu, Powell, & Kardes, 1986). These automatic evaluations might then lead to an avoidance state (see Cacioppo & Berntson, 2001; Chen & Bargh, 1999; Ito & Cacioppo, 2001). Such a state could impact some behaviors like academic testing by leading participants primed with the negative stereotype to withdraw effort and/or attention from the subsequent test. This account is ill equipped to

⁴ The sample ($n = 33$) with which the mood alternative was tested in this experiment (Bargh et al., 1996, Experiment 2) was not the same as that with which the behavioral change was tested, thereby obscuring the extent to which mood mediated the behavioral change.

account for some academic testing effects, however. As just noted, decrements in cognitive performance have been demonstrated for groups that are likely to be evaluated positively overall, as well (e.g., supermodels). As a whole, the obtained results do not seem to be consistent with a category-evaluation explanation. This is not to say that automatic evaluation cannot impact a variety of subsequent behaviors. We simply note that such evaluative processes do not appear to account well for some behaviors like stereotype-based academic performance decrements.

Four additional mechanisms appear to provide more plausible accounts for a variety of stereotype priming effects. These include automatic goal activation, behavioral tags, biased perception, and activation of possible selves. We describe each in turn.

Automatic goal activation. The automotive model (Bargh, 1990; Bargh & Gollwitzer, 1994; Chartrand & Bargh, 1996) specifies that motivational or goal states can be automatically activated by environmental features and influence later behavior without awareness. According to this model, features of the situation or environment that are reliably associated with goal or motivational states will become highly linked in memory. Much as proposed for ideomotor theory, such goal states are therefore capable of being activated by both internal and external stimuli and do not require conscious intent for their operation.

On the face of it, an automotive explanation may appear empirically indistinguishable from the ideomotor account. Indeed, both explanations have sometimes been offered for the same data (see Bargh, 1997; Bargh et al., 1996; Bargh & Gollwitzer, 1994, for explanations of the process by which priming rudeness or politeness impacts behavior). However, Bargh and Gollwitzer (1994; see also Bargh, 1997) insightfully note that the two processes might be distinguished by observing their impact on behavior over time. Whereas behavioral effects stemming from cognitive priming would be expected to diminish over time (as activation of the prime diminishes), the behavioral effects of automatic goal activation should increase over time until the goal is completed. For example, consistent with the view that participants primed with achievement-related words have a goal activated, they will surreptitiously attempt to continue working on a task even after being signaled to stop (Bargh, Gollwitzer, Lee-Chai, & Barndollar, 1997, cited in Bargh, 1997). Furthermore, an additional study demonstrated that whereas the perceptual effects of the prime (as measured by ratings of an ambiguous individual) dissipated over time, the motivational effects of the prime (as measured by task performance) increased over time. The results of the latter study importantly demonstrate that a single prime can have effects on behavior via multiple routes and that the observed effect of the prime may therefore be contingent on the dependent measure used in the experiment (see Bargh & Chartrand, 2000).

One weakness of the automotive model when applied to stereotype priming is that it is not entirely clear which particular goal should be activated in response to many primes. For example, it seems plausible that one could automatically activate the goals associated with the stereotype (i.e., the goals that category member might have), but it also seems plausible that one could automatically activate the goals that one typically has in response to members of that social category. For example, an individual primed with the African American stereotype might activate the goal to display dominance and aggressiveness, consistent with the African American stereotype of hostility. On the other hand, that

same individual could activate the goal of avoidance or withdrawal, consistent with some individuals' typical goals in the presence of African Americans. Thus, it is not clear from which perspective the goal should be activated when stereotype primes are used. This, in fact, might be moderated by the extent of self-involvement with the primed material such that high levels of self-involvement would increase the likelihood of stereotype-member congruent goal activation (e.g., Wheeler et al., 2001). If we assume that the activated goal is that of the stereotyped category member, the predictions of the automotive model would be similar to that of ideomotor theory.

Note that many situations permit the execution of multiple goals equally. When walking down the street or when engaged in a dyadic interaction, for example, displays of aggressive dominance or passive withdrawal are each applicable. However, these opposing goals would lead to exactly the opposite behaviors. Many experimental settings are constructed such that only one goal is likely to be activated and that the situation permits the expression of only a single goal. However, in many real-world situations, opposing goals could be activated, and therefore, determining which goal is primed is critical for accurately predicting the behavior that should follow from stereotype activation.

Behavioral tags. Another alternative is that activation of the stereotype could simply increase the accessibility of traits that serve as behavioral tags to modify whatever behavior happens to take place in the situation (Dijksterhuis, 2001). Thus, in the Bargh et al. (1996) experiment, the elderly stereotype may not have resulted in the activation of a *walk slowly* behavioral node but instead resulted in the activation of a *slow* behavioral tag that modified the behavior that naturally took place (i.e., walking to the elevator). In a similar fashion, activation of the African American stereotype could impair test performance, not by directly activating test-related actions (e.g., reading carelessly) but instead by activating traits like *apathetic* or *lazy* that influence whatever behaviors typically occur during the testing session.

In some ways, this alternative framework offers greater parsimony than the basic ideomotor account. Specifically, rather than considering the dizzying array of specific behaviors that could potentially be tied to a stereotype-relevant trait, one could predict that all subsequent behaviors, whether related to the stereotype or not, would be affected by the tag (at least to the extent that the tag is relevant to the behavior). For example, walking slowly is a specific behavior that is likely to be highly related to the elderly stereotype, but running or typing slowly are actions that are less likely to be explicitly and directly associated with the elderly stereotype. That is, we rarely consider that elderly persons would run a slow 40-m dash or make a poor secretary. At a minimum, these types of behaviors should be associated only weakly with the stereotype. A strict ideomotor argument might suggest that an elderly prime would lead to slower walking, but not slower running or typing, because the latter behavioral representations would be only weakly associated with the elderly stereotype, if at all. The behavioral tag alternative, on the other hand, would predict that nearly any subsequent behavior should occur more slowly following the elderly prime, whether or not the behavior itself (e.g., running a 40-m dash) was previously stored in memory as being relevant to the elderly stereotype. Thus, it could be that instead of (or in addition to) activating specific behavioral representations, stereotype primes activate trait-oriented behavioral tags that are

more broadly applicable to both stereotypic and nonstereotypic behaviors.

Evidence consistent with this alternative has been provided in the literature. For example, Macrae et al. (1998) timed how long it would take participants to read lists of words and manipulated only the label appearing at the top of the test.

Participants in the experimental prime condition received a list with "The Schumacher Word Reading Test" written at the top (Michael Schumacher is one of the world's most famous Formula One race car drivers). Control participants received a list with a neutral label ("The Shimuhuru Word Reading Test"), and no-prime participants received a list with no label. Results indicated that participants in the Schumacher prime condition read the list significantly faster than participants in the other two conditions. Although the prime of a race car driver might have a direct behavioral link to driving quickly, it should have little direct behavioral link to reading quickly. Nevertheless, the naturally occurring behavior in this case was still altered in a fashion consistent with the broader implications of the prime (i.e., speed).

Similarly, Dijksterhuis and Van Knippenberg (1998) found that participants who listed the attributes of a secretary completed subsequent trivial pursuit questions faster than participants in the professor-prime and no-prime conditions. Despite the fact that the secretary stereotype should be only weakly related to the behaviors of taking a test quickly or answering trivia questions quickly, behavior in this case was still changed to be consistent with the implications of the prime (i.e., doing things quickly).

Thus, it seems likely that in some cases at least, the important component of stereotype activation is the adverbial implications of the traits more so than any specific trait-related behaviors themselves. In the automatic stereotype-to-behavior studies to date, there have been no demonstrations of direct action initiation. That is, individuals have not been prompted to engage in a behavior that would not have been naturally occurring in that situation. Instead, demonstrations have focused on altering components of naturally occurring behaviors (e.g., the skill or speed with which one executes some naturally occurring action). These types of demonstrations can be compared with the numerous hypnotic demonstrations of ideomotor behavior in which individuals were prompted to engage in nonnaturally occurring behaviors such as adjusting a window shade, (though even these behaviors were limited by their compatibility with individual's goals; see Hull, 1961/1933). In sum, the behavioral-tag account appears capable of explaining the existing stereotype-to-behavior experiments conducted within the ideomotor framework. Showing that stereotype primes can elicit nonnaturally occurring behaviors would present a threat to this alternative account.

Biased perception. A third alternative concerns perception biases that could result from the stereotype prime. Prior research clearly has demonstrated that the accessibility of trait concepts can influence individuals' perceptions about the characteristics of ambiguous others (Carver et al., 1983; Devine, 1989; Herr, 1986; Higgins et al., 1977; Srull & Wyer, 1979). On the basis of such research, one could predict that individuals who have a self- or other-stereotype activated would act differently as a result of their changed perceptions of individuals in the behavioral setting or because of changed perceptions of the setting itself. Experimental evidence has demonstrated that primes can reliably alter not only judgment but also overt behavior as a result of a prime-induced

bias.⁵ For example, in one experiment (Herr, 1986), participants primed with moderately hostile or extremely nonhostile exemplars believed that their ambiguous interaction partner would behave more aggressively in a prisoner's dilemma game. As a result, they made more competitive choices when playing the game than participants primed with moderately nonhostile or extremely hostile exemplars (see also Neuberg, 1988).⁶

Accordingly, individuals in whom a stereotype is activated might exhibit behavioral changes because the stereotype activation leads them to interpret or perceive others or the situation differently. For example, those in whom the African American stereotype of hostility is particularly salient may perceive the experimenter to be more hostile or aggressive and exhibit more hostility as a result (e.g., being rude, performing more poorly on the experimenter's test). Similarly, activation of the elderly stereotype could reduce walking speed because the situation is interpreted as more leisurely (consistent with the elderly retiree stereotype). Biased interpretation as a result of priming should be most evident among those who are engaged in considerable cognitive activity (Petty & Jarvis, 1996). Thus, it is interesting to note that some research, at least, has demonstrated that behavioral priming effects can be stronger among individuals who have a high than a low propensity to engage in cognitive activity (see Petty, 2001), such as those high in their need for cognition (Cacioppo & Petty, 1982).

The idea that changes in perception can mediate changes in behavior is not a new one (see Herr, 1986; Holloway, Tucker, & Hornstein, 1977; Hornstein, LaKind, Frankel, & Manne, 1975; Neuberg, 1988), and the role of perception has been included explicitly in some models of behavioral priming (e.g., Bargh, 1997; Berkowitz, 1984; Carver et al., 1983, Experiment 1; Dijksterhuis & Bargh, in press). For example, Bargh (1997) explicitly noted that perception can be automatic and can mediate changes in behavior. However, this account differs somewhat from the one outlined here. Bargh (1997) reviewed evidence that traits can be automatically extracted from behaviors (e.g., Gilbert, Pelham, & Krull, 1988; Srull & Wyer, 1979; Winter & Uleman, 1984), that stereotypes can be automatically activated (e.g., Brewer, 1988; Devine, 1989; Mills & Tyrrell, 1983; Pratto & Bargh, 1991), and that self-information can be automatically processed (e.g., Bargh, 1982). The literature cited to support the perception-to-behavior link (Bargh et al., 1996; Carver et al., 1983), however, argues explicitly against the biased perception formulation suggested here and instead proposes an unmediated ideomotor account, or perception-to-behavior link, that does not involve behavioral changes in response to changed perceptions of others or the situation. For example, Carver et al. (1983, Experiment 2) reported research in which participants primed with hostility by means of a scrambled sentence task subsequently gave another individual

⁵ It is also possible that changed perceptions of other individuals or of the situation might not only impact behavior but could also follow behavior (see e.g., Chen & Bargh, 1997).

⁶ In this experimental paradigm, it was believed that extreme exemplars would lead to judgmental contrast, whereas moderately extreme exemplars would lead to assimilation (Sherif & Hovland, 1961). Therefore, moderately hostile and extremely nonhostile exemplars should both lead to increased judgments of hostility. See Herr (1986) for a more detailed explanation of this effect.

higher intensity shocks in a learning task. Although Carver et al. (1983) also replicated studies demonstrating that primed constructs can bias perception (in Experiment 1), the authors concluded that biased perception was not the mechanism through which the behavioral schemas exerted their effects (in Experiment 2). They stated,

our prediction is not based upon the assumption that priming the conceptual schema of aggression will cause subjects to see the other person in the interaction as aggressive. Rather, we assume that the prime will tend to activate the behavioral quality (as well as the perceptual quality) for potential use, and that once activated, it will tend to find expression. (Carver et al., 1983, p. 412)

There is only minimal evidence against the biased perception account, however. In the rudeness experiment described previously (Bargh et al., 1996, Experiment 1), for example, it was shown that the rudeness prime did not significantly alter the participants' perceptions of the experimenter. However, the experimenter's behavior in this experiment was explicitly designed to be unambiguous, a condition that minimizes the biasing effect of primed constructs on behavior (see e.g., Higgins, 1996). It could be that the rudeness prime altered participants' perceptions of the appropriateness of rudeness in this situation or this circumstance—something unmeasured in the study. Nevertheless, although it seems unlikely that biased perception mechanisms account for all stereotype priming effects because stereotypes, like other primed constructs, can bias interpretations of judgment targets (e.g., Devine, 1989), it seems unwise to dismiss the influence of biased perception processes entirely. Instead, we suggest that biased perception processes offer a plausible explanation for many stereotype priming effects and should be explicitly considered and assessed as a plausible alternative.

Possible selves. A final explanatory mechanism is highly related to the biased perception account. Here, perceptions of other individuals or of the situation are not altered, but instead, implicit or explicit perceptions of oneself change as a function of the prime. Thus, an additional possibility is that stereotype activation could cause activation of possible selves related to the semantic properties of the stereotype (see, e.g., Markus, 1977; Markus & Nurius, 1986) and that these altered selves serve to guide behavior. Research has shown that the content of the working self-concept can be altered by environmental influences (Markus & Kunda, 1986). Thus, participants in the automatic behavior studies might have selectively activated portions of their self-concept (or a possible self) as a result of the stereotype priming. For example, activation of the elderly stereotype could increase the accessibility of an old or slow possible self, or activation of the concept of rudeness could increase the accessibility of a rude or impolite possible self. In a similar fashion, activation of the African American stereotype could activate an underachieving or lazy possible self, whereas activating the Asian stereotype could activate an academically successful self.

Research has shown that the activation of possible selves can impact performance determinants such as effort toward and persistence at a task. For example, in one experiment (Ruvolo & Markus, 1992, Experiment 1), participants who imagined successful futures for themselves showed greater persistence at copying numbers with their nondominant hands and greater effort at proof-reading than participants who imagined unsuccessful futures for

themselves. Positive affect control participants had mean effort and persistence scores in between those of the success and failure imagery groups.

Additional research suggests that the effect of a prime on subsequent behavior is significantly strengthened when self-referencing occurs. For example, in one experiment described earlier (Wheeler et al., 2001), participants wrote an essay about a student who was presumably African American (i.e., Tyrone) or a student who was presumably Caucasian (i.e., Eric). Participants who spontaneously wrote their essays from the first person point of view showed significantly stronger effects of the stereotype prime on behavior than participants who wrote their essay from the third person point of view (a point of view by prime interaction). Specifically, participants who wrote about Tyrone (thereby activating the African American stereotype) from the first person point of view performed significantly worse on a subsequent standardized test than participants who wrote about Eric or wrote about Tyrone from the third person point of view.

This finding is consistent with other research on self-directed thought. For example, in one experiment, participants wrote stories that had to contain causal or noncausal words and self-related or other-related pronouns (Fenigstein & Levine, 1984). Following the story task, participants read hypothetical scenarios in which they were actors. Participants who wrote the stories using the causal words and the self-pronouns attributed greater causality to themselves in the scenarios than participants in the other three conditions. The use of self-relevant pronouns appears to increase the processing of information in self-relevant ways. This increase in self-relevant processing can then magnify the impact of accessible information on subsequent behavior and judgment.

Parallel findings have been obtained by Hull (in press), who reported that individual differences in private self-consciousness (Fenigstein, Scheier, & Buss, 1975) can moderate the magnitude of behavioral priming effects. Specifically, young individuals primed with the elderly stereotype walked more slowly but only when they were high in private self-consciousness. One account for these results is that individuals with high levels of private self-consciousness were more likely to process the primes as self-relevant despite their objective inapplicability to the self (see Hull, in press).⁷

These self-referencing findings should be distinguished from another self finding also reported recently. Specifically, Dijkster-

⁷ Although the Wheeler et al. (2001) and Hull (in press) experiments showed no differences between the experimental conditions under low self-relevance or private self-consciousness, some other research implies that alteration of the self-concept is not a requirement for behavioral assimilation effects. Dijksterhuis et al. (1998) showed that activated trait concepts can result in facilitated response latencies for judgments concerning the trait but that such facilitation is not moderated by self versus control primes before the judgment. Because there was no observed facilitation as a function of self versus control prime, it would seem that the constructs that were activated were not integrated into participants' working self-concepts (but see Mussweiler & Strack, 2000). However, because there was no behavioral assessment in this experiment, it is possible that behavioral changes would not have occurred either. Future research should examine whether some involvement of the self is a necessary condition for some stereotype priming effects or if it simply serves to magnify the effects of the stereotype prime.

huis and Van Knippenberg (2000) found that the behavioral effects of a stereotype prime can be eliminated under conditions of high self-awareness as manipulated by placing participants in front of a mirror (Duval & Wicklund, 1972). The authors speculated that self-awareness eliminates the prime's effect by making alternative behavioral cues salient. Presumably, in this paradigm, attention to one's internal state increased the salience of internally generated behavioral cues, thereby drowning out the effect of the externally presented prime. This account is consistent with other work, suggesting that the presence of mirrors can decrease the influence of situational cues and increase the impact of one's prior attitudes in a persuasion context (Hutton & Baumeister, 1992; see also Wilson & Capitan, 1982).

One paradoxical feature of self-awareness concerns its moderation of the influence of dispositional and situational information on thought and behavior (Hull, Van Treuren, Ashford, Prossom, & Andrus, 1988). More specifically, some experiments have shown that private self-consciousness increases the impact of situationally accessible information (e.g., Hull & Levy, 1979; Hull et al., 1988), and others have shown that private self-consciousness increases the accessibility of stored, chronically available information (e.g., Pryor, Gibbons, Wicklund, Fazio, & Hood, 1977).

The impact that self-relevant processing has on behavior could depend on the particular type of self-relevant processing that occurs. For example, writing about a stereotyped group member from the first-person perspective might be unlikely to heighten the activation of one's own dispositional characteristics. Instead, this type of manipulation could increase self-relevant processing of the stereotype, perhaps while making one's own dispositional characteristics less salient. Sitting in front of a mirror, on the other hand, could direct one's attention away from the stereotype prime and toward chronically accessible self-information. These findings make it clear that it is important to distinguish between manipulations that increase the processing of information as self-relevant and manipulations that increase the activation of competing self-information.

The possible-selves account, as well as the biased-perception account, can offer novel predictions for the stereotype-based behavioral change area. One such prediction is that people may experience feelings like evaluation apprehension or self-doubt that stem from stereotype activation but have nothing to do with a conscious fear of confirming a negative self-stereotype. As such, then, the possible-selves and biased-perception alternatives provide a link between the more implicit and explicit behavioral change mechanisms discussed in this article.

Although the biased-perception and possible-selves alternatives may appear to be the same mechanism with different targets of perception, there are important differences in the implications of each process. Perhaps of primary importance is the nature of the attributions that are likely to be drawn from the changed behavior. An action resulting from biased-perception processes is likely to result in external attributions (e.g., "The experimenter was a jerk!"), whereas an action resulting from possible selves is likely to result in internal attributions (e.g., "I'm just no good at academics"). Such attributions can have significant impacts on self-esteem and future behavior. For example, attributing failure to an external factor like situational handicaps (e.g., Berglas & Jones, 1978; Jones & Berglas, 1978) or to someone else's prejudice (e.g., Crocker & Major, 1989) can buffer one's self-esteem, whereas

failing because one perceives oneself to be a failure can be more detrimental. Similarly, experiencing success that is attributed to one's dispositional capabilities can have more positive effects than success that is attributed to situational factors and is therefore discounted (e.g., Crocker, Voelkl, Testa, & Major, 1991).

Assimilation Versus Contrast Effects in Behavioral Priming

As shown in Table 2, the dominant finding in all of the published stereotype priming experiments to date has been assimilation to the activated stereotype (i.e., 82% of effects). However, some studies have shown that individuals sometimes behave in ways that are opposite to the activated stereotype. That is, consistent with a great deal of research in social perception, attitudes, and decision making (see e.g., Schwarz & Bless, 1992; Sherif & Hovland, 1961; Stapel, Koomen, & Van der Plight, 1997), stereotype priming can result in behavioral contrast as well as assimilation.

Because most of the work on assimilation and contrast has examined judgmental rather than behavioral contrast, some caution should be used in generalizing moderating conditions. However, it seems reasonable to expect that many of the same principles would operate. Research on judgmental contrast suggests that contrast should be more likely to the extent that the target is very discrepant from the prime (e.g., Manis, Nelson, & Shedler, 1988; Sherif & Hovland, 1961), the target is unambiguous (Herr, Sherman, & Fazio, 1983), the prime is blatant, and the priming episode is available in memory (Lombardi, Higgins, & Bargh, 1987; Stapel, Martin, & Schwarz, 1998). Additionally, the use of the prime as a comparison standard increases the likelihood of contrast (e.g., Higgins, 1989; Stapel & Koomen, 2001b), though the focus of the comparison (self or standard) can moderate the effect (Mussweiler, 2000). Thus, priming conditions that facilitate the use of the prime as a comparison standard, such as using relatively distinct priming tasks (e.g., Stapel & Winkielman, 1998; Stapel et al., 1997), using exemplars rather than trait categories (e.g., Dijksterhuis et al., 1998; Stapel et al., 1997), and providing explicit comparison instructions (Stapel & Koomen, 2001a) should increase the likelihood that the prime will result in contrast rather than assimilation.

On the basis of this research, we suggest that the contrastive potential of the prime should be particularly apparent when the stereotype is perceived as highly discrepant from the target (e.g., the individual's self or possible selves), when the priming task is blatant or distinct, when the target is unambiguous (e.g., when individuals have well-articulated and highly defined assessments of their own traits and abilities), and when comparisons between the target and the traits implied by the stereotype are made.

It should be noted that these moderating factors are not simply additive and that a single characteristic listed above may not be sufficient to elicit contrast. Thus, very discrepant targets can still lead to assimilation when no comparisons are made, and moderately discrepant targets can still lead to contrast when comparisons are made. Comparisons with a meaningful, salient, extreme, and distinct standard should lead to contrast, however, and the available evidence supports this conclusion. For example, comparisons with a high achiever will lead to contrasting views of oneself, but only if the achiever's accomplishments seem unattainable (Lockwood & Kunda, 1997, 1999; see also Mussweiler & Strack, 2000).

Similarly, a fast animal (e.g., cheetah) prime will make one act more quickly if one does not believe that animals are a reasonable comparison standard, but when one believes animals and humans are similar, comparison with the discrepant target leads to contrast and hence to slower behavior (Aarts & Dijksterhuis, 2000, cited in Dijksterhuis & Bargh, in press).

Cognitive Accounts of (Automatic) Contrast

Some theorists have proposed that assimilation to an activated construct is the low-effort, default effect and that contrast results only from subsequent, effortful correction (e.g., Martin, Seta, & Crelia, 1990; Schwarz & Bless, 1992). More recently, however, research has shown that contrast can sometimes be the default effect and that effortful correction processes can lead to subsequent assimilation (see Petty & Wegener, 1993; Wegener & Petty, 1997; see also Stapel & Koomen, 2001b). Other work has shown that the assimilative and contrastive implications of primes can sometimes be simultaneously activated and exert their influence on different types of judgmental outcomes (Mussweiler & Strack, 2000). Additionally, some recent work has shown that comparison-based contrast can occur with only minimal effort (Gilbert, Giesler, & Morris, 1995; Moskowitz & Skurnik, 1999; Weary, Tobin, & Reich, 2001), and even correction-based contrast might occur under very low elaboration conditions (Glaser & Banaji, 1999). Hence, it seems plausible that more automatic, implicit, and cognitive mechanisms could also lead to perceptual contrast from activated self- or other-stereotypes, particularly under the conditions just outlined (e.g., when the prime is highly discrepant and distinct or available in memory and when comparisons are made).

The idea that stereotype primes that imply traits that are highly discrepant from the self might lead to behavioral contrast would be particularly consistent with the possible selves alternative. Although work using more implicit stereotype primes has not yet uncovered these effects, automatic behavioral contrast effects have been produced using exemplar primes (Dijksterhuis et al., 1998). As such, they might provide insight into how stereotype-based behavioral contrast could occur.

The available research thus far is supportive of the idea that behavioral contrast can occur by comparison of the primed memorial content to the self. Research has provided evidence that both the assimilative and contrastive implications of a prime can be activated following extreme exemplar primes. For example, in one study, following a prime of the exemplar "Einstein," both intelligence- and stupidity-related constructs were shown to increase in accessibility (Dijksterhuis et al., 1998, Experiment 3). These patterns of activation are hypothesized to take the form of initial comparison with the exemplar (e.g., "I'm no Einstein") and subsequent activation of the opposite construct (e.g., "I must be stupid"), though the order of such activation has not yet been demonstrated.

On the basis of such work, it seems possible that stereotype primes could lead to automatic behavioral contrast if they were used as a comparison standard (e.g., Dijksterhuis et al., 1998) and were perceived to be sufficiently discrete, extreme, and discrepant from one's current self or one's possible selves. Although it is possible that self-stereotypes will only elicit automatic behavioral assimilation and not behavioral contrast because they serve only as

an interpretation frame rather than a comparison standard (Dijksterhuis et al., 1998), factors that would encourage use of the stereotype as a comparison standard (e.g., a self-evaluation goal) might be expected to enhance the likelihood of obtaining the same types of automatic contrast effects previously observed with exemplar primes.

Motivational Accounts of (Deliberative) Contrast

Stereotype primes can also elicit a variety of motivational processes that could produce behavioral contrast regardless of whether those stereotypes are positive or negative or are about oneself or others. Comparisons with the implications of a self- or other-stereotype can undermine self views, boost one's confidence, or be perceived as a challenge. The nature of the individual's psychological state and the motivational mechanism by which the individual changes his or her behavior should determine both the extent and direction of the behavioral change.

Contrast from positive other-stereotypes. First, when comparison with a primed other-stereotype is unfavorable (i.e., the other-stereotype is more positive than oneself), it can sometimes lead to overtly experienced phenomena analogous to the stereotype threat postulated for stereotyped group members (Aronson et al., 1999; Stone et al., 1999). Aronson et al. (1999) provided evidence of contrast from positive other-stereotypes. They argued that indirect stereotype threat can be induced in Caucasian participants by evoking comparison with the Asian stereotype. In this experiment, Caucasian male participants were told that they were engaging in an experiment designed to determine why Asians outperform Caucasians at math. A control group was not told anything about Asian math performance. Results indicated that activation of the other-stereotype of Asian math achievement led the Caucasian participants to perform more poorly on the test than when the stereotype was not activated (contrast from the activated Asian stereotype). Aronson et al. argued that the Caucasian participants in whom the positive stereotype was activated performed poorly not because a negative stereotype existed about their group but because comparison with the positive other-stereotype had negative indirect implications for themselves. Research supports the idea that there is no stereotype alleging the inferior academic performance of Caucasians (Aronson & Disko, 1998, as cited in Aronson et al., 1999; Niemann, O'Connor, & McClorie, 1998). Hence, the contrast appeared to result not from the stereotype itself but from its contrastive implications for the test takers.

Similar results have been found for additional other-stereotypes as well. For example, Caucasian participants performed more poorly on a physical task following the activation of the positive African American stereotype of natural athletic ability, and African Americans underperformed following the activation of the positive Caucasian stereotype of sports intelligence (Stone et al., 1999). When comparisons to the positive other-stereotype are made and seen as discrepant from one's self-view, subsequent performance can decrease, despite the positive direct implications of the other-stereotype. This performance decrement is plausibly due to the threat or anxiety of confirming the implied low expectations for one's own group.

Contrast from negative other-stereotypes. Just as behavioral contrast from positive other-stereotypes can be mediated by motivational factors, so too can behavioral contrast from negative

other-stereotypes. For example, the activation of negative other-stereotypes could increase performance by decreasing anxiety, increasing confidence, or increasing perceptions of self-efficacy in a process that might be called *stereotype relief*. Some evidence for indirect, comparison-based improvement is suggested by the existing stereotype threat literature. Specifically, across a number of experiments, Caucasian men have shown a consistent, though nonsignificant, tendency for increased performance when told that the test that they are about to take typically shows gender differences or race differences (see, e.g., Spencer et al., 1999; Steele & Aronson, 1995). Thus, comparing oneself to those whom one perceives to be inferior may not only increase self-esteem (e.g., Festinger, 1954; Fein & Spencer, 1997) but also improve one's own performance by reducing performance anxiety or pressure.

Contrast from negative self-stereotypes. Because stereotypes about others might be more distinct and more likely to be perceived as highly discrepant from oneself, they may be more likely to lead to contrast than activated self-stereotypes. However, comparison to discrepant self-stereotypes might also lead to behavioral contrast by motivational mechanisms. When a negative self-stereotype is rejected and the individual is motivated and able to alter his or her behavior, subsequent behavior can become less similar to the stereotype. Some work suggests that heightening identity salience among African Americans can enhance performance on a novel math task, particularly among individuals who held particular types of self-beliefs (Oyserman, Gant, & Ager, 1995). Specifically, one experiment demonstrated that heightened identity salience led to performance improvements among African American students who felt connected to the African American community, who were aware of racism, and who felt that achievement as an African American was important (Oyserman et al., 1995). Awareness of racism can buffer one's self-esteem in the case of failure (Crocker & Major, 1989), and when combined with a focus on achievement as an African American, can reduce pressure and lead to heightened achievement (Oyserman et al., 1995; see also Walsh et al., 1999).

Contrast from positive self-stereotypes. Lastly, under some conditions, positive self-stereotypes can also create contrast, leading to behavior that is more negative than or dissimilar to the positive implications of the stereotype. This prediction is based on research that has shown that positive audience expectations can undermine performance on difficult tasks (Butler & Baumeister, 1998), especially when those positive expectations are not mirrored by the individual's private expectancies (Baumeister, Hamilton, & Tice, 1985). Stated simply, perceived positive audience expectations about which one has doubts can lead to choking (Baumeister & Showers, 1986). In support of this type of account, Cheryan and Bodenhausen (2000) found that Asian American women performed worse than control participants when the public aspect of their Asian identities was made salient (by completing the Collective Self-Esteem Scale; Luhtanen & Crocker, 1992).⁸ Mediation analyses suggested that the effect was mediated by failures in concentration that presumably resulted from a fear of not confirming their positive ingroup stereotype (see also Brown & Josephs, 1999; Kray et al., 2001).⁹

Effects of bias correction. In all of the motivational contrast phenomena just outlined, individuals were faced with a stereotype that had implications for their own behavior. The implications of the stereotype, and not the stereotype itself, either facilitated or

hindered their desired behavior (here, presumably performing their best). The activation of the stereotype can be considered to be a biasing factor. In the face of stereotype salience, some individuals may attempt to debias their actions or judgments by instigating bias-correction processes. Bias correction attempts are likely to occur when the primed information is perceived to be an illegitimate basis for judgment or action (Fleming, Wegener, & Petty, 1999), such as when the prime is low in judged usability (Higgins, 1996), but could also occur when one simply does not like the implications of the prime for one's behavior (e.g., that one should behave in negative ways).

Depending on the debiasing strategy used, the individual may or may not be successful. One debiasing strategy would involve adjusting one's judgment or behavior based on one's assessment of the extent and direction of the biasing effect (e.g., Petty & Wegener, 1993; Wilson & Brekke, 1994).¹⁰ Alternatively, suppression or thought redirection attempts could be made. For example, directing one's attention to one's self-attributes could eliminate the impact of the prime on one's own behavior (see Dijksterhuis & Van Knippenberg, 2000), whereas attempting to suppress the stereotype could lead to ironic increased accessibility of the construct (Wegner, 1994) or at least to continued operation of the construct at the unconscious level (Wegner & Smart, 1997) that could exacerbate the biasing effect (e.g., via the operation of ideomotor mechanisms).

Attempts to counteract the influence of stereotype activation could also show ironic effects, not because of changes in construct accessibility but because of ironic performance decrements as the result of choking (e.g., Aronson et al., 1999; see Baumeister & Showers, 1986). Indeed, this type of failure is the basis of stereotype threat theory (Steele, 1997). These performance factors could impact actions beyond those typically categorized as performance behaviors. In fact, any basic skilled actions (e.g., the behaviors involved in making a good impression) can be disrupted by deliberate attempts to execute them well. Self-presentational concerns may also operate in many situations. Rather than attempting to distance oneself from the negative implications of a stereotype, for example, one may engage in self-handicapping (e.g., Berglas &

⁸ A third group of participants in whom the female stereotype was made salient did not differ from control participants. See Cheryan and Bodenhausen (2000) for a discussion of this finding.

⁹ Cheryan and Bodenhausen (2000) proposed that the difference between their results and those of Shih et al. (1999) was the result of the heightened salience of the public implications of the stereotype. Another alternative is possible. The items on the Collective Self-Esteem Scale (e.g., "I am a worthy member of the [racial] group I belong to."; Luhtanen & Crocker, 1992) may have also been more likely to evoke comparison of the self with the extremely positive ingroup stereotype, thereby increasing the likelihood of contrast.

¹⁰ It should be noted that the extent and direction of one's bias correction will depend on the individual's motivations in the situation. When the individual has an accuracy goal, he or she will attempt to accurately correct for the extent and direction of the bias. For some behaviors or judgments, however, accuracy may be less of a concern. For example, some individuals may prefer to perform as well as they can on a task, regardless of whether the performance is representative of their ability (but see Aronson, 1992).

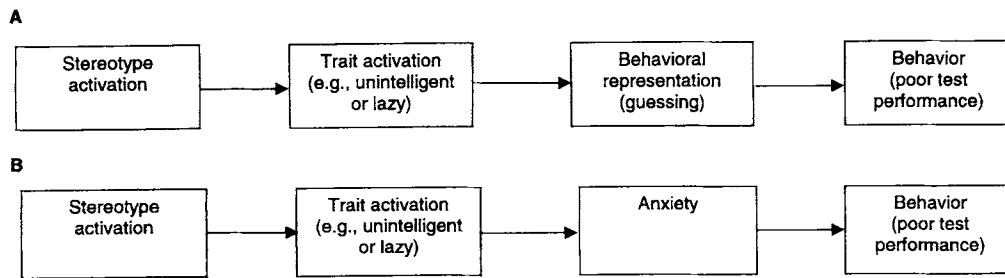


Figure 1. Possible mediational paths of stereotype activation on behavior.

Jones, 1978; Jones & Berglas, 1978) or disidentification with the task (Crocker, Major, & Steele, 1998) to protect one's self-image.

It is important to note that one need not be aware of the prime itself to engage in these types of correction strategies. That is, one might instigate correction or adjustment attempts any time one notices undesired behavior.¹¹ For example, individuals who observe themselves acting in an unusually hostile manner after subliminal activation of the African American stereotype may attempt to reduce their hostility, not because they are aware of the stereotype activation but simply because they do not wish to behave in that fashion (i.e., it conflicts with an internalized standard; see, e.g., Carver & Scheier, 1982). Behaviors incompatible with one's goals may be particularly likely to elicit conscious awareness and attempts to direct one's behavior toward actions more compatible with one's underlying goal structure (e.g., Baars, 1992; Carpenter, 1874; Carver & Scheier, 1998; Jastrow, 1906).

The factors we have discussed are not intended to constitute a comprehensive list of all potential moderators of stereotype priming effects. Instead, we simply wish to highlight the variety of cognitive and motivational factors that have been shown to impact behavior and to illustrate the dynamic forms of interplay between cognitive and motivational factors that could characterize stereotype-based behavioral change. In all of these forms of explicit contrast, one's psychological construal of the situation and the self are important in determining whether or not contrast occurs. For example, the same situation could be perceived as a threat or as a challenging opportunity, and such perceptions are likely to impact subsequent psychological reactions. Importantly, according to our analysis, both positive and negative expectations for one's performance can lead to both performance improvements and performance decrements.

Implications of Multiple Routes to Behavioral Priming

Our review of the effects of priming stereotypes on behavior has emphasized the multiple mechanisms by which such effects can occur. The fact that multiple mechanisms are possible and have not been sufficiently distinguished in prior research has implications for testing the moderation and mediation of behavioral priming effects. Our review has highlighted the mediational ambiguity that has characterized much of the prior research in this domain and has suggested that manipulating the method of stereotype activation (e.g., self vs. other, blatant vs. subtle) is not a sufficient basis for drawing strong conclusions about process. Additionally, we have proposed predictions for obtaining novel stereotype priming effects and suggested that future work should more clearly delineate

the moderating conditions of assimilation to self- and other-stereotypes. Because the same prime can impact behavior by multiple mechanisms, some care needs to be taken in testing mediation for stereotype priming effects. Both relatively implicit and more explicit mechanisms of stereotype-induced behavior change might share common mediators. For example, some recent (and admirable) attempts to get at the difficult mediational issue have shown that the impact of a stereotype prime on behavior can be accounted for by the increased accessibility of relevant trait constructs (Dijksterhuis, 2001; Dijksterhuis & Bargh, in press). Demonstrating the increased accessibility of trait concepts following a stereotype prime is important but does not distinguish between a number of plausible alternatives. For example, stereotype-relevant traits might be highly accessible in both the hot motivational and cold cognitive explanations that we have outlined. That is, African Americans experiencing stereotype threat and Caucasian participants who implicitly alter their behavior following an African American prime might both have the trait *unintelligent* or *lazy* accessible, for example, but could alter their behavior for very different reasons. Two such possible paths are depicted in Figure 1. The top panel shows a possible mediational path for the ideomotor account. Here, the stereotype activates the trait of unintelligence or laziness, and behavior follows mechanistically from the activation of stereotype- and trait-relevant behavioral representations. The bottom panel shows a possible mediational path for the stereotype threat account. Here, the trait of unintelligence or laziness is activated, but behavior is changed as the result of the conscious anxiety that follows a fear of confirming the negative stereotype and related traits.

The particular mediational sequence that occurs has important implications for the motivational versus cognitive nature of the experience for the individual, the generality of the impact of the stereotype, and its consequences for the individual. For example, as we noted earlier, the behavioral-tag account predicts that the stereotype would have a broader impact on behavior than the ideomotor account, and the auto-motive account predicts longer term behavioral effects than the biased-perception account. Similarly, the consequences for the individual will differ as a function of the route of the effect. An individual who performs poorly on a new test because of an implicit mechanism like ideomotor activa-

¹¹ In this instance, the correction would not map on to the term as used in the judgmental bias literature (i.e., correcting for the influence of an identified source of bias) but would simply refer to attempts to avoid an undesired outcome.

tion may infer that the poor test performance was due to low ability. On the other hand, an individual who performs poorly on a new test because he or she fears confirming a negative group stereotype might be more likely to conclude that situational factors like test anxiety, and not internal factors like low ability, were responsible for the test score.

Conscious Versus Unconscious Primes

As just suggested, the means through which a stereotype exerts its impact on behavior can have important long-term implications for the actor. The means of stereotype activation could also have a similar impact. Specifically, consciously activated stereotypes can be discounted by the actor when he or she is aware of the stereotype's biasing influence, but unconsciously activated stereotypes are presumably impervious (or less susceptible) to such discounting (see Bornstein, 1992, for a similar analysis).

In addition to these attributional effects, one might suspect that the means of stereotype activation would reliably indicate the direction of the stereotype activation effect. Table 1 outlines the means of stereotype activation (conscious vs. unconscious) as well as the direction of the effect (assimilation vs. contrast). As can be seen, both assimilation and contrast are possible with conscious primes. Effects of unconscious stereotype primes on behavior, by contrast, have only resulted in assimilation. However, the extent to which contrast from unconscious primes is possible has yet to be thoroughly examined. To the extent that automatic comparison and correction can occur, it is presumably possible for subliminal primes to produce contrast effects.

Despite similar assimilation outcomes resulting from conscious and unconscious primes, the primes could be associated with different processes. For example, one could argue that because subliminal primes are inaccessible to conscious awareness, they should be unlikely to result in a fear of confirming a negative self-stereotype (i.e., stereotype threat; Dijksterhuis & Corneille, 2000). However, equating priming method with process may be unwise. Hot and cold processes can be instigated by both conscious and unconscious priming methods, and each type of process may operate in parallel.

Automatic Versus Controlled Processes

At first glance, it would appear that for nonconscious automatic behavior effects to occur in isolation, it would be necessary that the stereotype was out of awareness, or at least that the target drew no connection between the stereotype activation and subsequent behavior (Bargh, 1994; Dijksterhuis & Corneille, 2000). Researchers in the automatic behavior tradition have used a lack of participants' awareness of the stereotype and its implications as a basis for arguing for the automatic nature of the stereotype's effects (whether or not the stereotype activation was subliminal; e.g., Dijksterhuis & Corneille, 2000; Dijksterhuis & Van Knippenberg, 1998). When participants are aware of the stereotype activation, behavior changes might be more likely to occur as a result of the consciously experienced mechanisms explained above, either alone or in conjunction with more direct automatic behavior effects.

Some evidence suggests that the automatic and controlled aspects of a stereotype's impact on behavior are not additive (Dijksterhuis & Corneille, 2000) and that increasing an individual's attention to his or her behavior can eliminate behavioral priming effects (Dijksterhuis & Van Knippenberg, 2000). However, given the flexible and interactive nature of automatic processing, it is premature to theorize that automatic and conscious processes will always occur in isolation to produce behavior. More likely, automatic and controlled processes cooperate to determine the impact of stereotype activation on behavior. Similarly, it may be unproductive to attempt to determine which of the specific mechanisms we have outlined provides the one true account of behavioral priming effects. Rather different mechanisms are likely to operate in different circumstances and/or for different people. For example, for one individual, the most prominent aspect of a stereotype might be a specific behavioral node (e.g., walk slowly), whereas for another it might be a more global trait (e.g., leisurely).

To better understand the means by which stereotypes impact behavior, it is necessary to understand, among other things, the nature of the stereotype activation. Most of the ideomotor phenomena described by early theorists (e.g., Arnold, 1946; Carpenter, 1874; James, 1890/1950) resulted from conscious thought or deliberation and occurred when the thought was still in mind. For example, the individual who unwittingly swings Chevreul's pendulum in the expected direction has the thought of that direction in mind at the time of the action (e.g., Carpenter, 1874). Similarly, individuals who engage in certain actions as the result of waking suggestion have the suggestion in mind at the time of the behavioral occurrence. By contrast, more recent experiments on automatic behavior have used priming procedures or experimental paradigms that ensure that the prime is not in conscious awareness at the time of the action, either because the participant believes the experiment in which the prime was consciously activated has ended or because the prime was activated subliminally and was thus never conscious. Presumably, the primed content is still activated, but such activation is unconscious rather than conscious.

This type of activation corresponds to a state Wegner and Smart (1997) labeled *deep activation*. The aforementioned procedures are not the only means by which deep activation is achieved, however. Wegner and Smart (1997) suggested that a primary means to achieve deep activation is suppression of unwanted thoughts. On some occasions, thought suppression results in ironic rebounds of the unwanted thought into conscious awareness (Wegner, 1994). However, even when suppression is apparently successful, the unwanted cognition may be deeply activated, unconsciously highly accessible, but consciously out of awareness.

This state of deep activation may therefore be prevalent not only in experiments conducted within the ideomotor framework but also within the stereotype-threat framework. Some evidence suggests that stigmatized group members about to take a diagnostic, stereotype-relevant test experience a state like deep activation (see Wegner & Smart, 1997, for discussion). For example, in one experiment (see Steele & Aronson, 1995, Experiment 3; see also Kray et al., 2001), African Americans in whom their self-stereotype was made salient attempted to suppress or avoid the stereotype, as evidenced by avoiding claimed conformance to the stereotype and failing to indicate their race on a demographic questionnaire. Despite these attempts to suppress the stereotype, however, the stereotype was still highly unconsciously active, as

evidenced by word fragment completions that were stereotypic and reflected high levels of self-doubt.¹² Thus, the conscious activation of stereotypes can lead to attempts to suppress the stereotypes, but such suppression may likely fail to eliminate stereotype activation altogether. Instead, the activation may simply become unconscious. This implicit or unconscious stereotype activation might then lower performance via ideomotor mechanisms outside of awareness.

We should note one important point of departure between our framework and that of Wegner and Smart (1997). Wegner and Smart proposed that deep activation is a sort of next-in-line process of activation. That is, deeply activated (i.e., unconsciously activated but not consciously activated) materials have a tendency to be the next things to pop into consciousness, as evidenced by the extensive work on thought suppression (Wegner, 1994) as well as other work such as that on insight (e.g., Bowers, Regehr, Balthazard, & Parker, 1990). However, a great deal of research has shown that mental contents can be unconsciously accessible (and influence judgment and behavior) without ever entering conscious awareness. For example, in mere exposure paradigms that use subliminal stimulus exposure (e.g., Bornstein & D'Agostino, 1992), individuals evidence unconscious reception of the stimulus without any tendency to manifest conscious awareness of having seen the object. Thus, unconscious activation may sometimes increase until it broaches the cognitive threshold (e.g., when one is thinking about a problem or suppressing an unwanted thought), but other times the unconscious activation may slowly dissipate without ever reaching conscious awareness. Which of these two outcomes occurs will likely depend on the strength of the initial activation as well as the patterns of cognitive activity (e.g., rumination or suppression) that lend direct or ironic activation to the construct.

Even when the stereotype itself does not reach conscious awareness, it can still have consciously recognized effects. Stimuli presented outside of awareness can impact physiological responding (Corteen & Wood, 1972; Masling, Bornstein, Poynton, Reed, & Katkin, 1991; see Wegner & Smart, 1997). Presentation of threatening stimuli outside of awareness can increase arousal (e.g., Bornstein, 1990; Masling et al., 1991), and these subtle physiological reactions could heighten one's dominant reactions to stimuli (e.g., Schachter & Singer, 1962; Zajonc, 1965). In fact, threatening stimuli presented subliminally can increase self-reported anxiety despite the fact that the source of the anxiety is unconscious (Robles, Smith, Carver, & Wellens, 1987). Similarly, unconscious activation of the African American stereotype could implicitly create negative affect (Steele & Aronson, 1995) that operates even when the stereotype is out of awareness. Heightened unconscious activation of the academic-underachiever component of the African American stereotype, for example, could lead one to feel uncertain about one's abilities without the ability to pinpoint the nature of the uncertainty (i.e., the unconscious stereotype activation). In fact, individuals are frequently unable to report the sources of their actions or thought processes accurately (e.g., Nisbett & Wilson, 1977).

Importantly, the interplay between conscious and automatic processes is likely to continue throughout the behavioral process. Behavioral changes that are initiated primarily as the result of one mechanism may be perpetuated by another, and actions initiated by both cognitive and motivational factors could exhibit this type of

process interplay. For example, activation of a negative performance stereotype could initially impair performance primarily as the result of ideomotor mechanisms. However, as the performance continues and the individual observes his or her poor performance, other more motivational factors may come into play. Aware that he or she is performing poorly, an individual may begin to experience self-doubt or anxiety about failure. Of course, the same pattern could also occur for positive stereotypes. An individual experiencing positive ideomotor-based sports performance following activation of a positive athletic stereotype is likely to experience increased confidence, and this increased confidence is likely to impact subsequent performance (see also Stone et al., 1999, Footnote 4).

Evidence for similar processes already exists in the literature. Stereotype activation can lead to changed perceptions of another individual's behavior via biased perception mechanisms (Devine, 1989) but can also lead to changed perceptions of another individual via confirmatory behavior mechanisms (Chen & Bargh, 1997). We propose that the same processes could occur for the self. That is, activation of a stereotype could lead to changes in one's perception of oneself directly but could also lead to changes in one's perception of the self via actual changes in one's own behavior (e.g., Bem, 1972).

Given the multiple types of interplay that can exist between conscious and automatic processes, we believe that it is overly simplistic to assume that conscious consideration of a stereotype will automatically eliminate ideomotor effects. For example, although the effects of conscious, motivational concerns could sometimes be strong enough to overpower any automatic effects, processes like biased perception or the activation of possible selves can be implicitly initiated but have explicit, consciously mediated effects. The emerging and more complex picture is that conscious and automatic processes can co-occur, instigate each other, or override each other (see Wegner & Bargh, 1998, for a review). Thus, the multiple processes outlined in this article could operate in parallel and also influence each other's operation.

Despite this complexity, some processes should be more likely to operate in certain situations than others. For example, biased perception processes should be less likely to operate in situations in which the actors or situational demands are unambiguous. The task for future research may not be to delineate the conditions under which either controlled or automatic processes influence behavior but instead to examine the relative contributions of these different processes to behavioral outcomes.

Conclusion

Throughout our review, we have emphasized the multiple means through which stereotype primes can impact behavior. Parallels between the stereotype threat and automatic behavior literatures are only now beginning to be recognized in the literature, and thorough comparisons between the mechanisms of each mediational pathway have not been tested empirically. Though much of

¹² Though we speculate that suppression attempts were at least somewhat successful, the extent to which the stereotype itself was consciously accessible is unclear. No measures of conscious stereotype accessibility were included.

the literature has examined academic performance as a dependent variable, similar principles should predict other behavioral changes as well. Our analysis provides a framework within which to consider stereotype-based behavioral change and also points to potential new effects that have not yet been demonstrated empirically. We believe that hot and cold processes both play a role in the effects of stereotype activation on behavior, independently or in conjunction, and that both implicit and explicit influences may co-occur. The important task for future researchers is to examine the relative contribution of these processes in determining stereotype-driven behavior changes.

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