



## Categorizing others and the self: How social memory structures guide social perception and behavior<sup>☆</sup>

Kimberly A. Quinn<sup>a,\*</sup>, Harriet E.S. Rosenthal<sup>b</sup>

<sup>a</sup> School of Psychology, University of Birmingham, UK

<sup>b</sup> Department of Psychology, Durham University, UK

### ARTICLE INFO

Available online 24 August 2012

#### Keywords:

Social categorization  
Stereotyping  
Stereotype activation  
Self-categorization  
Stereotype threat

### ABSTRACT

In keeping with the special issue theme of “Remembering the Future,” this article provides a selective review of research on how memory for social information (i.e., social category representation) influences future processing and behavior. Specifically, the authors focus on how categorization and stereotyping affect how we perceive others and ourselves. The first part of the article reviews research on how individuals perceive others. The authors review research on the determinants and outcomes of social categorization and stereotype activation, concluding with the influence of ingroup/outgroup categorization on face processing. The second part of the article reviews research on how individuals perceive themselves. The authors argue that stereotype threat—concerns about being judged or behaving in ways that confirm negative group stereotypes, leading to poor performance—is the result of both self-categorization and stereotype activation. Overall, the article highlights the complex relationship between memory for social category information and future social perception and behavior.

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The theme of this special issue is “Remembering the Future.” As social psychologists, we have approached this topic by considering how memory shapes processing when the targets are *people*. In particular, we have chosen to provide a selective review of research on social categorization and stereotyping. We do not address the question of *how* memory for social category information is organized and structured. Theorists have disputed whether social categories are represented as abstract prototypes or aggregations of multiple category exemplars, as localist or distributed, as probabilistic or embedded in broader theories, and so on (for a review, see [Smith, 1998](#)), and definitive evidence in favor of any one particular view has yet to be found. Instead, we provide an overview, guided by our own areas of expertise, of the determinants and outcomes of social categorization and stereotyping, both in how they relate to our perceptions of others and in how they relate to our perceptions of ourselves. Our review highlights the complexity of these processes, demonstrating that although memory for social category information does shape future social perception and behavior, this influence is by no means direct and without constraint. Instead, future social perception and behavior are determined by a dynamic interplay between memorial representation, processing context, and perceiver goals.

<sup>☆</sup> Portions of this paper were supported by ESRC First Grant RES-061-23-0130 (K. A. Quinn), ESRC Grant RES-000-22-2732 (H. E. S. Rosenthal and K. A. Quinn), and British Academy Small Grant SG47616 (H. E. S. Rosenthal).

\* Corresponding author at: School of Psychology, University of Birmingham, Edgbaston, Birmingham B15 2TT, UK.  
E-mail address: [K.Quinn@bham.ac.uk](mailto:K.Quinn@bham.ac.uk) (K.A. Quinn).

## The Building Blocks of Categorical Person Perception: Social Categorization and Social Category Representation

Any given individual can be construed in innumerable ways—according to identity, race, sex, age, emotional state, body posture, occupation, religion, clothing style, and so on—making social perception infinitely complex. Given the computational challenge facing social perceivers, social psychologists have accorded a central role to social categorization and stereotyping, going so far as to assert that social perceivers automatically and inevitably begin the person perception process by categorizing others according to visible dimensions such as sex, race, and age. In his seminal analysis of prejudice, [Allport \(1954\)](#), for example, argued that mere exposure to a social target was sufficient to trigger social categorization and stereotyping. This line of thinking has influenced theories of person perception for decades—most notably, [Brewer's \(1988\)](#) dual-process model and [Fiske and Neuberg's \(1990\)](#) continuum model. Although the models differ in their positions about the relationship between stereotyping and individuation—with the continuum model giving priority to stereotyping and depicting individuation as a correction process, and the dual-process model assuming that perceivers choose implicitly between stereotyping and individuation (even foregoing stereotyping entirely)—they both assert that some form of (at least perceptual) categorization is the first, inevitable step in person perception.

The importance accorded to categorization and stereotyping is based on two assumptions: that categorization is more efficient than identity recognition, and that stereotypes allow perceivers to take mental shortcuts to save time and processing capacity, treating group members as functionally equivalent and interchangeable. The first assumption is related to the ease with which physical features, particularly in faces, can be used to retrieve relevant information from memory: Quite simply, it is easier to extract category membership from a face than to recognize its owner's identity, in that many social category dimensions (e.g., sex, race, age) are readily apparent in physical features whereas full-blown identity recognition requires retrieval of nonphysical features (e.g., name, occupation, traits). Evidence for this assumption comes from [Cloutier, Mason, and Macrae \(2005\)](#), who demonstrated that three different manipulations of processing difficulty (inversion, blurring, brief presentation) impaired participants' ability to identify familiar celebrities but not to categorize them by sex. This efficiency derives, at least in part, from the fact that even a single feature can support categorization ([Cloutier & Macrae, 2007](#)) but that identity recognition is heavily reliant on the extraction of configural or holistic information across multiple features (e.g., [Leder & Bruce, 2000](#); [Maurer, Le Grand, & Mondloch, 2002](#); [Rhodes, Brake, & Atkinson, 1993](#)).

The second assumption is related to the requirements of social inference: generating inferences about a target individual's unique constellation of mental states, goals, and traits requires more attention and processing effort than does the retrieval of already-stored inferences about other members of the target individual's social category. Evidence for the attention-/capacity-saving nature of stereotyping was first reported by [Macrae, Milne, and Bodenhausen \(1994\)](#), who demonstrated that when participants were provided with a social category label to guide their person perception, they subsequently showed better memory for nonstereotypic information than if the category label had not been available. [Sherman, Lee, Bessenoff, and Frost \(1998\)](#) extended this research to demonstrate that the provision of a social category label enabled participants to direct attention away from stereotype-consistent information and toward stereotype-inconsistent information.

### Categorizing and Stereotyping Others

Given the complexity of social inference and the efficiency of stereotyping, it is perhaps unsurprising that social categorization and stereotyping have been regarded for many years as the automatic and inevitable first steps in person perception (e.g., [Allport, 1954](#); [Fiske & Neuberg, 1990](#)), suggesting that memory for social category information does indeed shape processing in the future. Supporting this reasoning was work reported by [Dovidio, Evans, and Tyler \(1986\)](#). In their research, they presented participants with a category label (e.g., "Black" or "White") followed by adjectives (e.g., "musical," "metallic") that were either racially stereotypic or nonstereotypic. Participants' task was simply to report, as quickly as possible, whether each item could ever be true of the primed category. As expected, participants responded more rapidly when stereotypic rather than nonstereotypic items followed the priming label. Nonetheless, because participants' attention was directed explicitly toward the category label, this early demonstration failed to provide unequivocal evidence of automatic stereotype activation. However, [Devine \(1989\)](#) demonstrated that even preconscious presentation of racial stereotypes was sufficient to influence subsequent processing and to lead participants to judge an ambiguous target in a racially stereotypic way. In subsequent research, preconscious cues were shown to also prompt stereotype activation in the domains of sex, age, and occupation (for a review, see [Bargh, 1999](#)).

The importance of these demonstrations is that stereotype activation has both direct and indirect implications for impressions; that is, memory traces laid down in the past to represent social-category-level beliefs have the power to shape future impressions of *individuals*. The direct influences come from the activation of stereotypic beliefs themselves, which may be added (or averaged) into one's general impression of the target. Not surprisingly, when all one knows about an individual is that he or she belongs to a particular social category, the stereotype associated with that category can determine the perceiver's impression of that individual (e.g., [Heilman, 1984](#); [Locksley, Borgida, Brekke, & Hepburn, 1980](#); [Nisbett, Zukier, & Lemley, 1981](#); [Secord, Bevan, & Katz, 1956](#)).

More interesting, however, are the indirect effects that emerge when activated stereotypic concepts influence the selection and interpretation of other available information. Stereotypes appear to direct attention and influence which information gets encoded and how information is interpreted, such that people often notice instances that confirm their existing stereotype-based beliefs ([Bodenhausen, 1988](#); [Chapman & Chapman, 1967, 1969](#); [Higgins & Bargh, 1987](#); [Rothbart,](#)

Evans, & Fulero, 1979), interpret ambiguous information as confirming their stereotypes (D'Agostino, 2000; Darley & Gross, 1983; Duncan, 1976; Jacobs & Eccles, 1992; Jones, 1990; Kunda & Sherman-Williams, 1993; Sagar & Schofield, 1980), and actively seek information that confirms their view of others (Snyder & Swann, 1978). Thus, memory for social category information leads to more stereotypic and less personalized (and arguably less accurate) representations of individuals in the future—in other words, to the creation of new memory structures (impressions) that guide future interactions with and behaviors toward those individuals, and do so through the lens of stereotyping.

Several studies suggest that the assimilative effects of stereotyping extend even to situations in which apparently irrelevant information is available to supplement category membership information (e.g., Hilton & Fein, 1989; Krueger & Rothbart, 1988; Locksley et al., 1980; Raskinski, Crocker, & Hastie, 1985). Thus, ample evidence has accrued to demonstrate the effects of stereotypes on social judgment (e.g., Biernat, Manis, & Nelson, 1991; Duncan, 1976; Kunda & Sherman-Williams, 1993; Sagar & Schofield, 1980; Vallone, Ross, & Lepper, 1985). Similar outcomes have been observed in the context of jury decision-making (e.g., Bodenhausen & Wyer, 1985) and job applicant evaluation studies (e.g., Heilman, 1984). These outcomes have been shown to occur even when other, presumably more relevant, information is available to guide judgment.

The assumption that stereotype activation was automatic and would inevitably lead to all of these outcomes, however, was challenged by Gilbert and Hixon (1991). Backed by a revised conception of automaticity (Bargh, 1989, 1994; Logan, 1989), they argued that stereotype activation and application were only conditionally automatic—that is, dependent on certain triggering conditions. Gilbert and Hixon demonstrated that mere exposure to a stimulus target (e.g., an Asian woman) was not sufficient to prompt stereotype activation but, rather, that stereotype activation required attentional resources; participants who were under cognitive load at the time of exposure to the target showed no evidence of increased stereotype activation. Since this initial demonstration, a host of other factors have been shown to moderate stereotype activation, including perceivers' processing goals (Macrae, Bodenhausen, Milne, Thorn, & Castelli, 1997; Pendry & Macrae, 1994), self-esteem (Spencer, Fein, Wolfe, Fong, & Dunn, 1998), hormonal fluctuations (Macrae, Alnwick, Milne, & Schloerscheidt, 2002), visual attention (Macrae, Bodenhausen, Milne, & Calvini, 1999), prejudice level (Lepore & Brown, 1997; Locke, MacLeod, & Walker, 1994; Moskowitz, Gollwitzer, Wasel, & Schaal, 1999), and mental imagery (Blair, Ma, & Lenton, 2001), as well as target gaze direction (Macrae, Hood, Milne, Rowe, & Mason, 2002) and context (Kurzban, Tooby, & Cosmides, 2001; Wittenbrink, Judd, & Park, 2001).

#### *Whence Social Categorization?*

Missing from the foregoing review—and, indeed, from previous treatments of person perception and stereotyping—is the categorization process itself. As the process of recognizing another individual's social category membership, social categorization is arguably a necessary precursor to the activation of the social memory structures formed in the past (i.e., stereotypes) that guide current and subsequent social perception and behavior. Influential models of social perception such as the dual-process model (Brewer, 1988) and the continuum model (Fiske & Neuberg, 1990) and the research that they inspired, however, merely acknowledged social categorization as the starting point in social perception. They assumed that social categorization was inevitable and inflexible and chose to focus investigation on accounting for the downstream outcomes (e.g., stereotyping, stereotype-driven impression formation and behavior) that ensued from categorization. More recently, however, as social psychologists have come to appreciate the importance of the face in person perception (Zebrowitz, 2006) and begun to consider the cognitive and neuroscientific models of face recognition (e.g., Bruce & Young, 1986; Haxby, Hoffman, & Gobbini, 2000, 2002), an emerging body of research has begun to examine the links between lower-level perceptual processing of facial features and higher-order social cognition—that is, at the initial categorization phase that provides the initial construals of social targets that feed into social perception.

Much of the early research in person construal was targeted toward the question of whether categorical thinking is unconditionally automatic, as suggested by the dominant person perception models. Even as researchers were beginning to question whether stereotype activation was unconditionally automatic, however, they continued to maintain that social categorization was fully automatic. In Gilbert and Hixon's (1991) demonstration that attentional resources at encoding were necessary for stereotype activation, even those participants who failed to show evidence of racial stereotype activation were able to correctly remember the race of the target, leading Gilbert and Hixon to argue that although the target had been categorized at encoding, the subsequent stereotype activation had been disrupted. An alternative explanation for the pattern, however, is that participants encoded a visual representation of the target without categorizing the target and simply retrieved the image and categorized the target later, when prompted.

Indeed, several pieces of evidence now indicate that social categorization, like stereotype activation, is not unconditionally automatic. Quinn and Macrae (2005, Experiment 1), for example, varied the nature of participants' initial encoding of faces in a repetition-priming paradigm, such that half of the participants categorized faces by sex and half of the participants passively viewed the faces. At test, all participants categorized faces by sex, but only those participants who had engaged in sex categorization at initial encoding demonstrated faster responding to repeated than to new faces. The absence of repetition priming among participants who passively viewed faces at initial encoding suggests that these participants had not spontaneously categorized the faces by sex—despite the fact that the stimuli were selected so that sex was the most obvious form of construal.

Similar findings were also reported by Macrae, Quinn, Mason, and Quadflieg (2005) using an interference paradigm. Participants viewed forenames superimposed on images of faces; their task was to judge the stereotypic gender of the name

(Experiments 1–3) or the case in which the name was printed (Experiment 3). Results indicated that participants were slower to respond when the stereotypic gender of the name was inconsistent rather than consistent with the sex of the face on which it was superimposed—but only when they were judging the gender of the name and not when they judged the case in which the name was printed.

Finally, Quinn, Mason, and Macrae (2009) demonstrated that even when social categorization is task-relevant, it might not emerge for all social targets. They used an automatic priming paradigm to investigate whether participants would automatically respond to unfamiliar and familiar others according to identity versus social category. Specifically, on each trial of a reaction-time task, participants categorized by sex the second of two faces; the first (prime) face was either matched or mismatched to the sex of the target face but also varied in terms of whether it was familiar (in this case, a celebrity) or not. On the basis of reasoning that it would be inefficient to categorize rather than identify familiar faces, Quinn et al. predicted—and found—that sex priming (i.e., faster responding to prime-sex-matched than -mismatched targets) emerged only when the prime faces were unfamiliar. That priming did not emerge from familiar faces suggests that these faces were not categorized by sex, despite the clear relevance of the dimension to the task.

More recently, person construal research has shifted from the question of whether social categorization is automatic to the question of how it emerges, starting with early visual processing. According to Freeman and Ambady's (2011) dynamic interactive theory, person construal emerges gradually “through ongoing cycles of interaction between categories, stereotypes, high-level cognitive states, and the low-level processing of facial, vocal, and bodily cues” (p. 250). A central assumption of the model is that the processing involves time-dependent competition between partially active and parallel representations. Perceptual processing extracts features from the targets themselves—for example, face, voice, and posture cues to identity, sex, race, and age—but also features of the processing context (e.g., cues that mark targets as members of contextually rare categories). This processing triggers multiple representations in memory (e.g., stereotypes, representations of similar targets encountered previously, representations of previous encounters with the targets themselves). Meanwhile, representations that were already active when the targets were encountered (e.g., embodied emotional states, self-relevant goals) also contribute to processing. The model asserts that all of these representations compete and over time settle into a stable state, which often results in a single construal. According to this perspective, memory for social category information can indeed shape future processing, but it can only do so by “winning” the competition against other active representations.

Freeman and colleagues have provided a number of demonstrations for the partial and parallel activation of social category representations that eventually settle into stable states. They presented participants with faces (centered at the bottom of the computer screen) and recorded participants' computer mouse movements as they moved the mouse to one of two response alternatives (which appeared in the top left and right corners of the screen). Parallel activation was measured as the extent to which participants' movements were “pulled” toward one response alternative as they moved the mouse to select the other response alternative. Freeman, Ambady, Rule, and Johnson (2008) demonstrated that when participants were presented with sex-atypical faces (vs. sex-typical faces), their mouse trajectories exhibited continuous deviation toward the opposite-sex category response; that is, the mouse trajectories were “pulled” toward the opposite-sex category response rather than moving in a straight line from the target face to the correct response category. Freeman, Pauker, Apfelbaum, and Ambady (2010) replicated this pattern with race categorization, and Freeman and Ambady (2009) demonstrated that it applied not only to social categorization but also to stereotype activation. Freeman and Ambady (2011) have also extended this line of research to examine multicue integration—namely, face and voice integration. Using the same mouse-tracking paradigm, they demonstrated that when categorizing a face by sex, hearing a sex-atypical voice influenced participants' movements, yielding mouse trajectories that deviated toward the opposite-sex category response before settling on the correct category response. Thus, multiple memory-based representations of social category information compete to influence future perception and behavior.

Evidence for the emergence of a single categorical construal when faced with *competing* construal dimensions comes from Quinn and Macrae (2005, Experiment 2). Using a standard repetition-priming paradigm, they demonstrated that although repetition priming emerged when participants engaged in the same categorization task at encoding and test, it did not emerge when participants switched tasks. For example, participants who engaged in sex categorization at both encoding and test were faster to respond to repeated than new faces at test, but participants who engaged in age categorization at encoding and sex categorization at test responded to repeated and new faces with equal speed at test, implying that they had not categorized faces according to both age and sex during stimulus encoding (despite sex as a salient visual cue). Thus, when multiple construals are available, it appears that perceivers selectively use the relevant dimension and avoid using competing information.

That this process is time-dependent is supported by Quinn, Mason, and Macrae (2010). They conducted a modified replication of Quinn et al.'s (2009) automatic priming experiment to investigate when participants would automatically respond to unfamiliar and familiar others according to identity versus social category. Time course was manipulated by presenting prime faces for 100 or 150 ms (plus a 50 ms mask) on the assumption that identity-related processing would require at least 165 ms of stimulus exposure (Grill-Spector & Kanwisher, 2005). Quinn et al. (2010) found that for *unfamiliar* targets, category-based responding (i.e., sex priming) emerged at both time points, most likely because the category-relevant information extracted at the earlier time point would not be superseded by identity-relevant information. In contrast, for *familiar* targets, category-based responding emerged only at the earlier time point, ostensibly because the identity-based information extracted at the later time point was sufficient to negate the influence of the category-based information.



As the foregoing review suggests, it is not inevitable that memory for social category information will shape future processing. Even the lowest-level access to social category memory—social categorization—is constrained by a host of perceiver and context factors, and by the availability of other forms of social memory (e.g., preexisting representations of individuals). Social category memory *does* shape the future—indirectly by shaping our perceptions, and directly by shaping our behaviors that in turn shape the behaviors of others—but other factors (e.g., current processing goals, individuated knowledge) mitigate the effects of social category memory.

### *A Special Case of Other Categorization: Ingroup/Outgroup Categorization*

A special case of other-categorization is ingroup/outgroup categorization—that is, categorizing others according to whether they belong to the same social groups as we do. Ingroup/outgroup categorization has the same cognitive outcomes as more general other-categorization—namely, within-category assimilation and between-category differentiation—but also has the added motivational component of self-relevance. The self-relevance of ingroup/outgroup categorization has implications for *how* we process information. This is perhaps seen most clearly in research on the other-race effect, or the general finding that we are better at differentiating between and recognizing faces of our own race than faces of other races (e.g., Malpass & Kravitz, 1969; see Meissner & Brigham, 2001; Meissner, Brigham, & Butz, 2005, for reviews).

Although the other-race effect appears to have a perceptual expertise component (e.g., Brigham & Malpass, 1985; Kelly et al., 2007), there is now strong evidence that social categorization also plays a critical role in shaping own- and other-race face processing. That is, although early experience certainly contributes to memory representations that constrain our ability to differentiate between and subsequently recognize faces from unfamiliar racial categories, the impact of these representations on future behavior is constrained by other factors, such as ingroup/outgroup status. According to the social-categorization perspective, the other-race effect emerges because either the coding of race-specifying information (e.g., skin tone) occurs at the expense of individuating information (Levin, 1996, 2000) or the categorization of other-race faces as outgroup members undermines perceivers' motivation to process other-race faces in terms of individual identity (e.g., Hugenberg & Sacco, 2008; Hugenberg, Young, Bernstein, & Sacco, 2010). Much of the evidence for the latter position comes from Hugenberg and colleagues, who have demonstrated that inducing White participants to categorize White faces as outgroup members can lead to poorer recognition of those faces relative to White faces categorized as ingroup members (Bernstein, Young, & Hugenberg, 2007; Shriver, Young, Hugenberg, Bernstein, & Lanter, 2008; Young, Hugenberg, Bernstein, & Sacco, 2009).

Although Hugenberg and colleagues have failed to find evidence that ingroup/outgroup categorization similarly influences recognition of other-race faces (Shriver et al., 2008), such evidence has recently been found by Cassidy and colleagues, whose research suggests that the influence of ingroup/outgroup categorization is dependent upon encoding context and goals. In terms of encoding goals, Cassidy, Humphreys, and Quinn (in preparation) demonstrated that participants showed better recognition of ingroup than outgroup other-race faces following an encoding task that encouraged configural processing (a likeability judgment task), but not following the intentional memory task used in much cross-race research. In their research, White participants studied own-race (White) and other-race (Black) faces for later recognition (Experiments 1, 3) or evaluated the faces for likeability (Experiments 2, 4) and then completed a recognition test; ingroup/outgroup categorization was manipulated by labeling the faces as being from the same university or a different university, and face inversion provided an index of configural processing (Experiments 3–4). The results revealed that when participants explicitly encoded faces for later recognition, outgroup categorization impaired own-race recognition, but ingroup/outgroup categorization had no effect for other-race faces (Experiments 1, 3); without this goal, ingroup/outgroup categorization had no effect for own-race faces, but outgroup categorization impaired other-race recognition (Experiment 2). The face-inversion manipulation revealed important processing differences as a function of encoding goal: when participants encoded faces for later recognition, inversion effects even for own-race faces were negligible, suggesting that intentional memory goals disrupt “normal” configural processing (Experiment 3); without this goal, only outgroup-categorized other-race faces failed to elicit inversion effects (Experiment 4).

In terms of encoding context, Cassidy, Quinn, and Humphreys (2011) investigated the impact of ingroup/outgroup categorization on the encoding of own-race and other-race faces presented in interracial/high-race-salience and intraracial/low-race-salience contexts. White participants performed a same/different matching task on pairs of upright and inverted faces that were either own-race or other-race, and own-university or other-university. In Experiment 1, the own- and other-race faces were intermixed (interracial context); in Experiment 2, faces were blocked by race (intraracial context). For other-race faces, participants demonstrated greater configural processing following ingroup than outgroup university categorization, regardless of race salience. This suggests that other-race faces are initially processed as outgroup members regardless of context, but that nonracial cues to ingroup status can mitigate against racial outgroup status, at least to a certain extent. For own-race faces, however, participants demonstrated greater configural processing following ingroup than outgroup categorization only in the intraracial context. Cassidy et al. suggested that own-race faces are initially processed as ingroup members and that decreased race salience is required for nonracial outgroup status to undermine “normal” processing.

More recently, Cassidy, Boutsen, Humphreys, and Quinn (submitted for publication) replicated the interracial (i.e., mixed) context conditions while also measuring evoked response potentials (ERPs). Similar to the behavioral pattern found by Cassidy et al. (2011), analysis of the face-specific N170 component of the ERP waveform demonstrated that for own-race

faces, inverted-face processing was delayed relative to upright-face processing regardless of university affiliation. For other-race faces, however, the inversion effect on the N170 was reliable only for own-university faces. The N170 has been assumed to reflect the structural encoding of faces (Eimer, 2000), suggesting the ingroup/outgroup categorization operates very early in the social perception process—leading racial outgroup faces to be processed more like racial ingroup faces when another ingroup dimension is invoked. Thus, the early experience that shapes our representation of own- and other-race face representations is not the only influence on future processing; future processing is also influenced by context and alternative categorizations.

### Categorizing and Stereotyping the Self

Even more self-relevant than ingroup/outgroup categorization is self-categorization and the resultant self-stereotyping. When we consider our group memberships and our sense of belonging to a group, we often “anchor” our self-concepts on our representations of these groups, coming to see ourselves as possessing the traits that we consider to be typical of fellow ingroup members (Cadinu & Rothbart, 1996)—sometimes even to the point of self-stereotyping (Brewer, 1991). In this section of our review, we focus on the implications of self-categorization and self-stereotyping for behavior, specifically in the context of stereotype threat (and the less-studied context of stereotype boost/lift).

#### *Stereotype Threat: Negative Effects of Self-categorization as a Stereotyped Group Member*

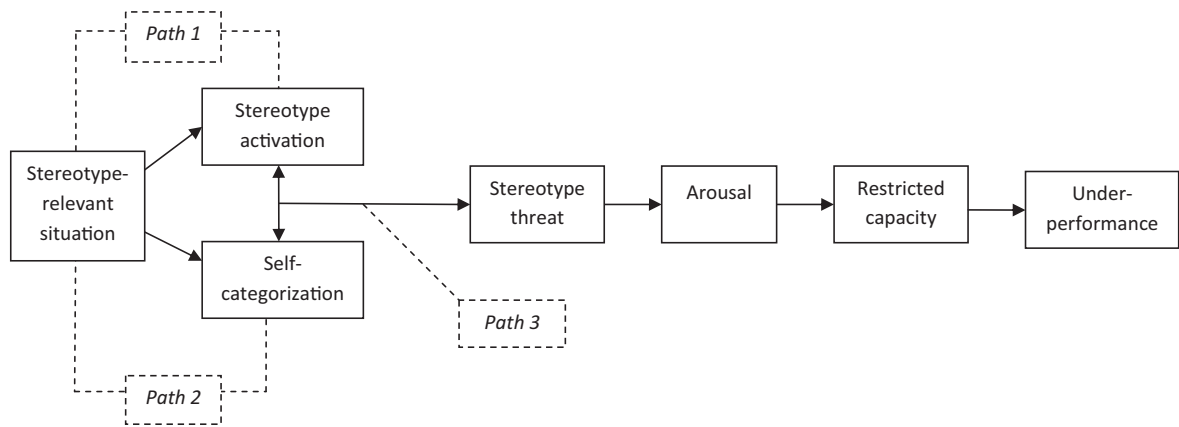
Stereotype threat is the self-threat experienced by members of negatively stereotyped groups that they will be judged by or behave in ways that confirm the negative stereotype (Steele & Aronson, 1995). The critical importance of this form of threat is that it can have the unfortunate consequence of actually precipitating the undesired behavior—for example, poor performance and underachievement in the stereotyped domain. Stereotype threat thus represents a very clear case of memory affecting future behavior.

Steele and Aronson (1995) were the first to investigate stereotype threat, by examining the stereotype of Black Americans and intelligence. They found that framing a test as indicative of diagnostic ability negatively affected the subsequent (future) performance of Black students, compared to Black students who were informed that the test was nondiagnostic of intelligence and White students regardless of how the test was described. Due to the negative stereotype that Black Americans are less intelligent than White Americans, Steele and Aronson concluded that awareness of negative stereotypes surrounding one's group can have a negative effect on behavior. Steele and Aronson also established that this negative effect also occurred when the students simply categorized themselves as a member of the negatively stereotyped group (stereotype primed by stating race) prior to taking the nondiagnostic test. This suggests that simply categorizing oneself as a member of a negatively stereotyped group (self-categorization) can result in underperformance, in line with the stereotype.

Stereotype threat is a robust effect, with similar results being found for a number of different academic ability stereotypes such as low-socio economic status and intelligence (Croizet & Claire, 1998), regional differences and intelligence (Clark, Eno, & Guadagno, 2011), women and math (Rosenthal & Crisp, 2006; Spencer, Steele, & Quinn, 1999), and White men and math (compared to Asian men: Aronson et al., 1999). Stereotype threat expands beyond academic stereotypes to include women and driving ability (Yeung & von Hippel, 2008), White Americans and sports performance (Stone, Lynch, Sjomeling, & Darley, 1999), and gay men and childcare (Bosson, Haymovitz, & Pinel, 2004), with stereotype threat effects constantly being replicated in different stereotyped domains.

However, despite the replicability of stereotype threat, there appears to be a number of moderators that affect the extent to which the individual experiences or is affected by stereotype threat (i.e., the extent to which the individual underperforms on the stereotyped task). Moderators can be broadly categorized into three areas: (1) factors that modify the stereotype; (2) factors that modify the situation; and (3) factors related to the individual that modify the effect. The first set consists of moderators which adjust the relevance or applicability of the stereotype. Such moderators include informing participants that the stereotype is irrelevant in the current situation (Ouwkerk, de Gilder, & de Vries, 2000), reminding participants of alternative domains in which their group is stereotypically successful (McIntyre, Paulson, & Lord, 2003), and highlighting atypical individuals who have been successful within the relevant domain (Marx & Roman, 2002). The second set of moderators specifically looks at situational factors which can moderate stereotype threat, such as being the only group member present (Sekaquaptewa & Thompson, 2002), or being in a minority (Inzlicht & Ben-Zeev, 2000), and the group membership of the experimenter (Davis & Silver, 2003). The third set of moderators can be broadly defined as individual differences between participants which can affect the occurrence of stereotype threat. These include levels of social dominance orientation (Danso & Esses, 2001), stigma consciousness (Brown & Pinel, 2003), testosterone level (Josephs, Newman, Brown, & Beer, 2003), domain identification (Aronson et al., 1999), and group identification (Schmader, 2002). The finding that many different and varied moderators of stereotype threat have been discovered (i.e., from testosterone level to the group membership of the experimenter) suggests that many different factors can affect the extent to which stereotype threat is experienced, advocates ways in which stereotype threat can be reduced (by adjusting the moderators), and also suggests that stereotype threat is more complex than simply occurring when placed in a situation that highlights a relevant negative group membership.

Relevant to our hypothesis that self-categorization is key to the occurrence of stereotype threat, additional previous research has examined mediators of stereotype threat, establishing the underlying processes which result in detrimental



**Fig. 1.** The cognitive process model of stereotype threat. *Note.* Dashed lines represent causal pathways.

performance. A number of mediators have been suggested. Due to the original proposition of Steele and Aronson (1995), anxiety as the underlying process for stereotype threat initially received the most attention. However, with studies both supporting (Bosson et al., 2004; Osborne, 2001) and opposing (Schmader, 2002; Stangor, Carr, & Kiang, 1998) anxiety as the underlying process, alternative mediators were proposed, including performance expectancies (Cadinu, Maass, Frigerio, Impagliazzo, & Latinotti, 2003; Stone et al., 1999), prevention (negative–outcome) focus (Grimm, Markman, Maddox, & Baldwin, 2009), working memory capacity (Schmader & Johns, 2003; Schmader, Johns, & Forbes, 2008), and mental load (Croizet et al., 2004). The lack of overwhelming support for one underlying process for stereotype threat, and the great number of moderating variables which appear to exist, suggests that stereotype threat is a complicated phenomenon which is yet to be fully understood.

Due to the competing moderators and mediators of stereotype threat, recent research has begun to view stereotype threat as integrated, attempting to explain the above findings in terms of a combined model of stereotype threat and its effects. In our own cognitive process model of stereotype threat (Rosenthal & Quinn, *in preparation*), we propose that when stereotyped-group members find themselves in stereotype-relevant situations, domain-relevant stereotypes are activated (e.g., women are poor at math), but that stereotype threat only occurs if they also consider their group membership as relevant (see Fig. 1). That is, stereotype threat only occurs when stereotype activation and self-categorization occurs. For example, when taking an intelligence test, individuals would need to become aware of their ethnicity or class status for stereotype threat to be possible; when taking a math test, individuals would need to become aware of their gender. If this self-categorization were to occur, it would activate category differentiation processes, leading to the exaggeration of differences between groups and the minimization of differences within groups (Tajfel, 1959). In combination with already-activated negative domain-relevant stereotypes, self-categorization should lead members of negatively stereotyped groups to consider the applicability of those negative stereotypes to themselves. In other words, stereotype activation and self-categorization are both critical precursors to stereotype threat and its effects. Once the appropriate situation (e.g., a mathematics testing situation) is in place, the model predicts the simultaneous activation of the related stereotype (e.g., “women are poorer at math than men”) and their own self-categorization (e.g., “I am a woman”). The combined result of these two activated elements is stereotype threat. This threat produces arousal, which in turn interferes with cognitive capacity and thus future performance.

Our model can be perceived to have three central causal pathways: (1) the link between the situation and domain-relevant stereotype activation; (2) the link between the situation and self-categorization as a member of the negatively stereotyped group; (3) the link for both stereotype activation and self-categorization as requirements for stereotype threat (see Fig. 1). Empirical tests of these causal pathways support our proposed model (for detailed information about methods and results, see Rosenthal & Quinn, *in preparation*), as does previous research.

Stereotype activation has been linked both directly and indirectly (via manipulations that have implications for the temporary content of the domain-relevant stereotype) to performance (Aronson, Fried, & Good, 2002; Blascovich, Spencer, Quinn, & Steele, 2001; Good, Aronson, & Inzlicht, 2003).

Self-categorization (e.g., in terms of recognizing one’s minority status, via activation of a generalized “social self”) has been shown to predict self-reported stereotype threat (Steele & Aronson, 1995) as well as performance (Ambady, Paik, Steele, Owen-Smith, & Mitchell, 2004; Inzlicht & Ben-Zeev, 2000; Yopyk & Prentice, 2005). In particular, the research of Rosenthal and colleagues offers empirical support for the impact of self-categorization on underperformance. Rosenthal and Crisp (2006) demonstrated that asking female participants to state characteristics that women and men share reduced stereotype threat in terms of both stereotypic career choice and math performance. That is, female participants who completed a shared characteristics task—which served to minimize perceived gender differences and undermine self-categorization—chose less stereotypical careers and completed more math questions correctly than participants in a control condition. Rosenthal, Crisp, and Suen (2007) demonstrated that this effect was even more pronounced when the shared characteristics were relevant

to the stereotyped domain, suggesting that undermining self-categorization may be particularly key when the situation activates the relevant stereotype.

There is some indirect evidence that stereotype activation in the form of information that controls the temporary content of the domain-relevant stereotype and self-categorization in the form of solo status or domain identification interact to produce arousal (Cadinu et al., 2003), and to impair cognitive capacity (Croizet & Claire, 1998) and performance (Schmader & Johns, 2003). Thus, although these studies provide some support for our model, they do so only indirectly, with the main support for our assertion that the experience of stereotype threat requires both stereotype activation and self-categorization coming from our own research (see Rosenthal & Quinn, in preparation).

Schmader et al. (2008) present a theoretical model of stereotype threat which is compatible with our cognitive process model. Their model focused on working memory as the key process behind stereotype threat, but also encompassed alternative mediators. They propose stereotype threat to be the result of an imbalance between the three concepts of (1) the ingroup; (2) the relevant ability domain; and (3) the self-concept. According to Schmader et al. (2008) the individual is motivated to resolve the imbalance that exists between these three concepts ("My group does not have this ability, I am like my group, but I think I have this ability", p. 338), and the imbalance results in three interrelated processes: (1) physiological stress; (2) cognitive monitoring; and (3) affective responses (i.e., the mediators outlined above). According to Schmader et al. (2008), any of these three processes can affect working memory and thus subsequent performance. As such, Schmader et al.'s model can be seen to focus on the stereotype threat/arousal stages of own model, while we focus on the precursors to stereotype threat/arousal: stereotype activation and self-categorization.

### *Stereotype Lift/Boost: Positive Effects of Self-categorization as a Stereotyped Group Member*

So far, we have focused on situations in which stereotypes have negative implications; that is, situations that result in underperformance for negatively stereotyped group members. However, stereotype threat situations also have implications for those who are members of a diametrically opposed group. For example, while women are seen as poor at math, in contrast, men are perceived as good at math. Situations that result in stereotype threat also have consequences for these opposed group members. There is a tendency for the group who are perceived as stereotypically good at the involved task (e.g., men on a mathematics test) to increase their performance when compared to the stereotypically inferior group (e.g., women on a mathematics test), which has been noted in a number of studies (e.g., Gonzales, Blanton, & Williams, 2002; Shih, Pittinsky, & Ambady, 1999; Spencer et al., 1999; Steele & Aronson, 1995).

This proclivity for members of the positively stereotyped group to improve their performance in stereotype threat contexts is an interesting occurrence, although it is usually a trend which does not reach statistical significance (Walton & Cohen, 2003). An exception to this is Croizet et al. (2004), who found a significant, positive difference for science students who were compared to psychology students on an intellectual test (see also Rosenthal, Norman, Smith, & McGregor, forthcoming). To examine this trend in more detail, Walton and Cohen carried out a meta-analysis on 43 stereotype threat studies, labeling the effect *stereotype lift*, although the effect has also been termed *stereotype boost* (Cheryan & Bodenhausen, 2000).

Interestingly, Walton and Cohen's (2003) meta-analysis revealed that both stereotype lift and stereotype threat are evident in studies, but that stereotype lift only retains half the power of stereotype threat. Walton and Cohen stated that stereotype lift is stirred by the same stereotypes as stereotype threat, that is, rather than being the result of emphasizing positive stereotypes (e.g., men are good at math), stereotype lift occurs as a result of emphasizing negative stereotypes (e.g., women are poor at math). In terms of our cognitive process model, stereotype lift can be seen as the result of activation of the negative stereotype, in combination with self-categorization as an opposed group member, with both necessary to result in stereotype lift (improved performance).

However, we are cautious about this hypothesis, due to competing research that has failed to find stereotype lift effects, instead finding that such similar conditions result in underperformance for these group members, an effect known as *choking under pressure* (Baumeister, 1984; Cheryan & Bodenhausen, 2000). Here, members of these opposed groups are seen to choke under the pressure of the expectations surrounding their 'positive' group membership, and so will underperform in situations where they are expected (due to their group membership) to perform well (Rosenthal & Crisp, 2007; Smith & Johnson, 2006). This tenant may suggest that stereotype lift results in improved performance due to a focus on a negative outgroup stereotype, while stereotype threat results in poorer performance due to a focus on a positive ingroup stereotype. As such, stereotype lift may result from activation of the outgroup stereotype and self-categorization, while choking may result from activation of the ingroup stereotype and self-categorization. However, this proposition is tentative, because as far as we are aware no studies have yet to examine stereotype lift and choking in the same study (see Rosenthal & Crisp, 2007), and as such it is currently unclear from previous research the precise situations under which choking under pressure, rather than stereotype lift, occurs.

While research surrounding the underlying processes of stereotype lift and choking has so far yet to determine the necessary conditions for each to emerge, what is clear from the stereotype threat literature is that self-categorization is a necessary prerequisite for the emergence of stereotype-related underperformance. It appears as though activation of the stereotype in itself may not be the key to understanding stereotype threat effects. Instead, the combination of both stereotype activation and self-categorization can result in stereotype threat.



## Conclusion

We addressed the “Remembering the Future” theme of this issue by focusing on how social categorization and stereotyping—processes that are based in memory for social category information—affect perceptions of others and the self. In terms of other-perception, we concluded that although social categorization and stereotype activation have previously been viewed as automatic processes, more recent evidence suggests that both are contingent on a variety of task, context, and perceiver factors. We also reviewed evidence that self-relevant categorization on the basis of shared/nonshared social category membership shapes processing. In both cases, we argued that social category memory is but one influence on future processing—that is, that the influence of social category memory on future perception and behavior is not direct and unconstrained. In terms of self-perception, we presented a cognitive process model and argued that stereotype threat—concerns about being judged or behaving in ways that confirm negative group stereotypes, leading to poor performance—is the result of both self-categorization as a member of a negatively stereotyped group and activation of the negative stereotype. We then extended this model to stereotype boost/lift, suggesting that better performance by members of positively stereotyped groups can also emerge from self-categorization and stereotype activation. Social categorization is but one memory-based process that enables social perceivers to make use of representations in memory to guide how they perceive themselves and others.

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