

- lations: Theories, themes, and controversies. In R. J. Brown & S. Gaertner (Eds.), *Blackwell handbook of social psychology: Intergroup processes* (pp. 133–152). Oxford, England: Blackwell.
- Urban, L. M. & Miller, N. (1998). A theoretical analysis of crossed categorization effects: A meta-analysis. *Journal of Personality and Social Psychology*, 74, 894–908.
- Wenzlaff, E. M., & Wegner, D. M. (2000). Thought suppression. *Annual Review of Psychology*, 51, 59–91.
- Wright, S. C., Aron, A., McLaughlin-Volpe, T., & Ropp, S. A. (1997). The extended contact effect: Knowledge of cross-group friendships and prejudice. *Journal of Personality and Social Psychology*, 73, 73–90.
- Yzerbyt, V. Y., Castano, E., Leyens, J.-Ph., & Paladino, P. (2000). The primacy of the ingroup: The interplay of entitativity and identification. *European Review of Social Psychology*, 11, 257–295.
- Yzerbyt, V. Y., Dumont, M., Wigboldus, D., & Gordijn, E. (2000). *I feel for us: A self-categorization account of intergroup emotions and action tendencies*. Catholic University of Louvain at Louvain-la-Neuve. Manuscript submitted for publication.

6

Intergroup Encounters and Threat

A Multi-Method Approach

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Veridically assessing emotional responses that occur during intergroup interactions often proves difficult for researchers. Educational, institutional, and cultural socialization that promotes the value of, and sensitivity toward, ethnic and racial diversity may exaggerate differences between self-reported and actual emotions and attitudes toward members of minority groups. Not surprisingly, social psychologists have become increasingly, but not exclusively, attracted to less consciously controlled or implicit measures of affect within the context of intergroup interactions. Here, we focus on the importance of using multiple measures, including both less consciously controllable, or covert, and more consciously controllable, or overt, ones for the study of intergroup interactions.

This chapter has four major sections. First, we provide a brief account of intergroup encounters within the context of our biopsychosocial model and cardiovascular measures of challenge and threat. Second, we describe four studies that examined perceivers' emotional and motivational reactions during social interactions with White and Black partners, which included both covert and overt measures. Third, we describe the results from a meta-analysis of these

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studies organized within a multi-method matrix that demonstrates convergences and divergences among covert and overt measures as a function of the interaction partner's race. Finally, based on the results of the meta-analysis, we review the utility of different types of measures and describe some apparent advantages of emotion-oriented covert measures over overt measures for the study of intergroup interactions.

A BIOPSYCHOSOCIAL PERSPECTIVE OF INTERGROUP INTERACTIONS

In our approach, we capitalize on the value of covert psychophysiological indexes for assessing emotional and motivational responses during intergroup interactions (Blascovich, 2000). As Cacioppo, Tassinari, and Bernston (2000) noted, the most meaningful physiological indexes bear a one-to-one relationship to the psychological construct they purportedly index. A one-to-one relationship provides the strongest basis for inferring psychological meaning from physiological responses. This type of relationship allows for the relatively unambiguous interpretation of changes in physiology in terms of changes in psychological processes. Physiological indexes have several advantages over other types of measures. Specifically, they are on-line (i.e., parallel to in vivo behavior), covert, and can be continuous (Blascovich, 2000). These qualities allow researchers to track emotional and motivational changes continuously even during actual interaction episodes. Furthermore, the use of covert measures, such as physiological ones, reduces concerns about demand characteristics and self-presentational factors that can be evoked during intergroup interactions. Hence, physiological measures can provide veridical assessments of emotions during intergroup encounters.

Two recent research efforts demonstrate the utility of psychophysiological indexes for examining perceivers' reactions to minority group members. The first, by Vanman and colleagues (Vanman, Paul, Ito, & Miller, 1997), employed facial electromyography (EMG) to assess affective reactions to White and Black targets. These researchers found evidence for greater negative affect (increased corrugator supercilli and decreased zygomaticus major activity—physiological responses validated as indexing affect; for a review see Blascovich, 2000) displayed by White participants when exposed to photographs of Black faces compared to White faces. The second, by Phelps and colleagues (2000), capitalized on recent advances in functional magnetic resonance imaging (fMRI) techniques to contrast activation occurring in the amygdala (a physiological response validated as an index of fear; LeDoux, 1998) of perceivers exposed to Black and White faces. Results of this study demonstrated that upon presentation of unfamiliar Black faces, more amygdalar activity was associated with greater implicit racial bias (e.g., implicit associates test and startle eyeblink).

Challenge and Threat

We also employ psychophysiological indexes to study intergroup interactions. We have and continue to do so within the context of our biopsychosocial model of challenge and threat (see Blascovich & Mendes, 2000, for an early review). Although the purpose of our work in this area initially was to test theoretical aspects of our model, it soon became clear that our model and research had import for the study of intergroup encounters (e.g., Blascovich, Mendes, Hunter, & Lickel, 2000; Blascovich, Mendes, Hunter, Lickel, & Kowai-Bell, 2001).

Our theoretical model of challenge and threat (Blascovich & Mendes, 2000; Blascovich & Tomaka, 1996; Tomaka, Blascovich, Kelsey, & Leitten, 1993) draws heavily from the coping research (e.g., Lazarus & Folkman, 1991) and cardiovascular reactivity to stress literatures (for a review, see Blascovich & Katkin, 1993). Empirically, we have generally adopted a multi-method approach that includes the examination of cardiovascular (CV) responses, task performance, and self-reported evaluations of demands and resources, performance, affect, and subjective well-being to test our model of challenge and threat.

Our challenge and threat model to date has been context-bound, studied only during motivated performance situations, which we define as episodes that are self- or goal-relevant, require instrumental cognitive responses, and are active rather than passive. Because many, if not most, motivated performance situations outside the laboratory occur in social contexts, we believe that actual social interactions provide a rich and ecologically valid context in which to study intergroup interactions. That is, work and school settings abound with examples of intergroup interactions that constitute motivated performance situations, such as negotiations, cooperative and competitive tasks, and, in some cases, conversations.

Perceived challenge and threat can be identified by responses gathered from pre-task evaluations of demands and resources related to the task situation. In validation studies, individuals who perceived the demands of a situation as outweighing their personal resources were characterized as "threatened"; individuals who evaluated resources as exceeding demands were characterized as "challenged" (Tomaka et al., 1993). In subsequent iterations of the theory (Blascovich & Mendes, 2000), demand evaluations were broadened to include *danger*, *uncertainty*, and *required effort*; resource evaluations included perceptions of *knowledge* and *abilities* relevant to situational performance, as well as *dispositional characteristics* and *external support*. It is possible that in a given situation one of these elements can trigger high overall demand or resource evaluations, similar to the thinking of Lazarus and colleagues (Lazarus, DeLongis, Folkman, & Gruen, 1985) who argued, "no single variable . . . can stand for stress" (p. 777); or in our terminology, "threat" however, we simultaneously consider all demand and resource elements and their potentially additive or synergistic effects.

Challenge and threat can also be indicated by specific CV responses. Fol-

lowing Dienstbier's (1989) work on physiological toughness, activation of the sympathetic adrenomedullary (SAM) axis is implicated in positive coping, whereas SAM activation and activation of the pituitary-adrenal-cortical (PAC) axis are associated with "stress" or negative responses (we label the former reaction challenge and the latter reaction threat). In our terms, challenge is marked by SAM activation, which enhances cardiac performance, particularly left ventricular contractility and cardiac output, and decreases systemic vascular resistance. In contrast, threat is marked by activation not only of the SAM axis, again increasing contractility, but also activation of the pituitary-adrenal-cortical (PAC) axis, which inhibits decreases in systemic vascular resistance (Blascovich & Tomaka, 1996). Thus, different patterns of CV responses differentiate challenge and threat states.

We use three cardiovascular responses, based on Dienstbier's work, to index challenge and threat: left-ventricular contractility (VC), measured as pre-ejection period (PEP), or the time from the initiation of left-ventricular contraction until the opening of the aortic valve ($VC = PEP \times -1$); cardiac output (CO), which is the amount of blood being pumped by the heart expressed in liters per minute; and total peripheral resistance (TPR), which is the amount of overall vasoconstriction or vasodilation occurring in peripheral blood vessels.¹ Challenge responses are marked by significant increases in VC and CO from baseline coupled with a significant decrease in TPR, whereas threat responses are marked by increases in VC (although typically not as large as increases during challenge), no change or a decrease in CO, and no change or an increase in TPR (see Figure 6.1). These markers have been used successfully to investigate challenge and threat processes in many areas, including stigma (Blascovich et al., 2001), social facilitation (Blascovich, Mendes, Hunter, & Salomon, 1999), social comparisons (Mendes, Blascovich, Major, & Seery, 2001), and dispositions (Tomaka, Palacios, Schneider, Colotta, Concha, & Herrald, 1999).

APPLICATION OF CHALLENGE AND THREAT THEORY TO THE STUDY OF INTERGROUP INTERACTIONS

In the past, we argued that our theoretical challenge and threat framework is well suited for the examination of emotionally charged responses that occur during dyadic interactions because such interactions often occur within the con-

1. We do not include heart rate (HR) as a specific component because HR contributes little to the differentiation of challenge and threat, though HR increases significantly during both. This is not surprising given the complexity of neural sympathetic and parasympathetic as well as endocrine controls affecting HR. Nevertheless, HR itself is informative within our motivated performance situation paradigm; we use it as an indication of goal-relevance (Obrist, 1981).

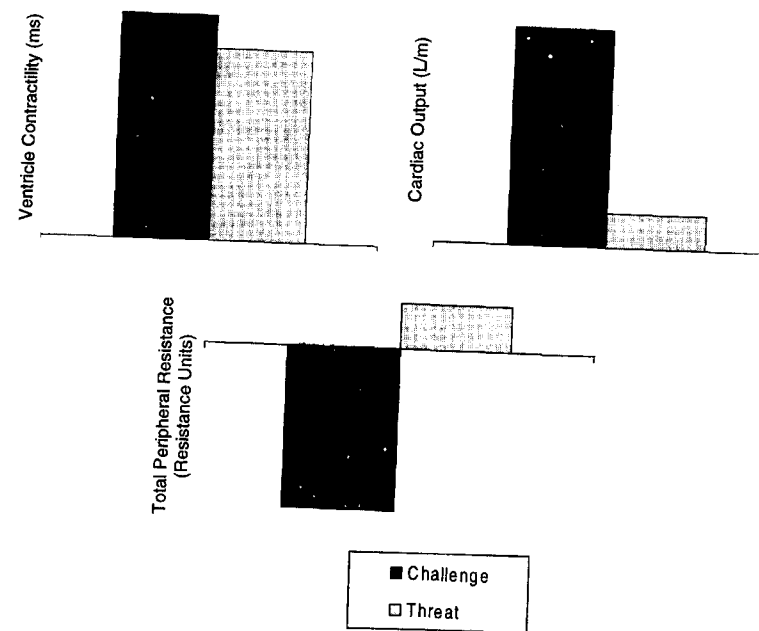


FIGURE 6.1. Cardiovascular responses indicating challenge and threat.

text of motivated performance situations; that is, they are goal-relevant and involve instrumental cognitive responses on the part of interactants (Blascovich et al., 2000). Consequently, we brought our theory and cardiovascular indexes to bear on the issue of intergroup and intragroup dyadic interactions. To date, we have completed more than 20 experiments that include the examination of emotional and motivational responses that occur during dyadic interactions focusing on the differences between intergroup and intragroup pairings. In the following section, we integrate intergroup theories with our challenge and threat appraisal theory to generate predictions regarding emotional responses of interactants during an intergroup encounter. We then briefly describe the basic paradigm we used for these experiments followed by a more detailed consideration and analyses of several intergroup studies germane to the issue of intergroup emotion.

Challenge and Threat Responses During Intergroup Interactions

Intergroup theories provide considerable grist for formulating predictions regarding challenge and threat responses during intergroup interactions. These theories suggest ways in which demands (i.e., danger, uncertainty, and required effort) and resources (knowledge and abilities, dispositions, external support) may be affected during intergroup encounters. Some theoretical perspectives address how perceived demands and resources are affected at the *individual* or

interpersonal level, whereas other perspectives address how evaluations are affected at the *group* level. In our model, perceptions of either or both individual and group harm or loss might trigger high demand evaluations.

Many theories suggest that intergroup interactions result in an increase in perceived demands. At an individual or interpersonal level, some theories suggest that intergroup interactions create anxiety or tension (Devine, Plant, & Buswell, 2000; Stephan & Stephan, 1985; Wilder, 1993). To the extent that such anxiety represents aversive psychological states, intergroup interactions can be regarded as dangerous. At a group level, social dominance (Sidanius & Pratto, 1993) and system-justification (Jost & Banaji, 1994) theories maintain that to the extent that individuals belong to groups perceived as lower status, they represent a danger to members of the dominant or powerful group in a culture.

The second element of demand evaluations is uncertainty, which would typically function at the individual level. Uncertainty, referring to the novelty and unfamiliarity of outgroup partners, may be a critical factor during intergroup interactions. Due to the relative infrequency of outgroup compared to ingroup interactions (Charles, 2000), we can expect that the more novel or unfamiliar an interactant is the more uncertainty surrounding that interaction. This uncertainty then may trigger a variety of compensatory actions that direct attention from the task at hand, thus leaving fewer task-related resources. Thus, in this case, uncertainty may be inextricably linked to required effort.

Vigilance efforts may increase during an intergroup interaction because the subtle nonverbal cues that govern two-way communication may be unfamiliar to interactants in a cross-cultural context (Gudykunst, 1984). Intergroup interactions may require increased cognitive effort in terms of self-monitoring because of additional or hidden agendas. At one extreme, perceivers may strive to present themselves as unbiased or nonprejudiced toward outgroup members (Devine, Evett, & Vasquez-Suson, 1996; Stephan & Stephan, 1985). At the other extreme, members of higher status groups than those of their interaction partners may seek to justify or preserve this imbalance (Jost & Banaji, 1994; Sidanius & Veniegas, 2000). Such an agenda requires perceivers to strive to perform in a clearly superior fashion to their partner. Finally, because intergroup interactions may evoke relevant negative stereotypes even in nonprejudiced individuals, increased effort may be expended to suppress stereotypes (Devine, 1989; Wyer, Sherman, & Stroessner, 2000).

Perceived resources during an intergroup interaction may not offset the increased demands and in some cases may be diminished, especially resources associated with knowledge and abilities. At the interpersonal level, individuals may perceive that they do not know the most appropriate way to communicate during intercultural interactions (Wiseman, 1995). Insofar as individuals perceive outgroup partners to possess different conversational and interpersonal norms than their own, they may perceive less knowledge and abilities in terms of interaction skills with outgroup members, resulting in awkward and strained

responses when confronted with an intergroup partner. At the group level, stereotype threat may adversely affect knowledge and abilities during an intergroup interaction if group membership is primed and negative stereotypes are relevant (Steele & Aronson, 1995). These arguments lead us to predict that interactions with outgroup members will result in greater perceived demands and potentially lower perceived resources for perceivers than the same interactions with ingroup members.

Basic Dyadic Interaction Paradigm

Each experiment reported here begins with two same-sex undergraduates (a naïve participant and a confederate) waiting about 10 meters apart in a hallway outside the entrances to our social psychophysiology laboratory. The experimenter introduces the participants to each other and confirms that they do not know each other. The experimenter provides them information about each other as a means of ensuring their perceived similarity or dissimilarity as a particular experiment requires. Immediately following this initial meeting, the experimenter takes participants to separate rooms to complete a variety of study-related forms. In some studies, we bring the participants back together to exchange some additional limited, but informative background information about themselves. The target confederate provides a prescribed background designed to manipulate a key variable such as socioeconomic status, similarity, typicality, and so forth within a particular study protocol. In other studies, we do not implement the exchange of such background information, leaving participants only the visual information they received upon arrival such as their own and their partners' race, or whatever similarity or dissimilarity information was initially provided by the experimenter.

Next, if they have been brought back together, participants are returned to their own recording rooms where appropriate sensors are applied for recording cardiovascular responses during the experiment. This is followed by an adaptation/rest period during which we instruct participants to sit at ease while we record baseline cardiovascular responses. Finally, we connect the participant's and confederate's recording rooms so that each can see and hear the other via audio speakers and video monitors. The participants then engage in several motivated performance tasks (e.g., speech delivery, word games) while cardiovascular responses are recorded. If multiple tasks are required, we disconnect the recording rooms to allow for a rest/recovery period prior to connecting the rooms again.

Relevant Intergroup Interaction Studies

Our research program has included the study of how a variety of different partner characteristics affect perceivers' responses during dyadic interactions. For

example, we have manipulated whether or not confederates were physically stigmatized by facial birthmarks, by their ostensible socioeconomic backgrounds, and even by their speech accents. We have employed confederates from a variety of racial and ethnic backgrounds, including Black, White, Asian, and Latino targets. In this review, we focus exclusively on perceivers' responses during dyadic interactions comparing those involving Black to White partners.

Social Interactions with Black versus White Male Partners. In one of our first intergroup experiments, we examined cardiovascular responses of non-Black male participants during social interactions with White or Black confederates (Mendes, Blascovich, Lickel, & Hunter, 2002). We predicted that non-Black participants interacting with Black partners would exhibit cardiovascular responses consistent with threat responses, whereas participants interacting with White partners would exhibit cardiovascular responses consistent with challenge responses. In addition to the race of the target, we also manipulated the target's socioeconomic status (SES) by having confederates describe their backgrounds as either advantaged or disadvantaged.

We observed differences in cardiovascular responses based on the race and SES of the confederates. Specifically, participants paired with Black or disadvantaged partners exhibited cardiovascular responses consistent with threat during the speech and word-finding tasks; participants paired with White or advantaged partners exhibited cardiovascular responses consistent with challenge. Participants who were paired with Black-disadvantaged confederates exhibited larger threat reactivity than any of the other conditions (an additive effect of the two main effects). In addition, participants paired with Black partners performed worse during a cooperative word-finding task than participants paired with White partners. That is, participants cooperating with Black confederates generated fewer words than did participants paired with White confederates even though the confederates always performed at the same level.

In contrast to their physiological and behavioral data, participants' self-reported attitudes painted a very different picture of the interaction. Participants interacting with Black confederates rated their partner more positively than did participants interacting with White confederates. That is, Black confederates were rated as more likable, independent, trustworthy, and hardworking than were White confederates. Participants also rated their partners on a variety of negatively valenced traits, and again Black confederates were rated as less unintelligent and unfriendly than were White confederates.

Social Interactions with Black versus White Female Partners: Moderating Factors. In this second study (Experiment 3 in Blascovich et al., 2001), we employed the same paradigm and experimental factors as in the previous study with two changes. First, we used female perceivers and targets (i.e., confederates). Second, we recruited participants who had completed a variety of

questionnaires in an earlier mass-testing session. These questionnaires focused on attitudes, beliefs, and contact regarding African Americans. Participants completed the Modern Racism Scale (MRS), the Motivation to Control Prejudiced Reactions Scale (MCPRS; Dunton & Fazio, 1997), and the Intergroup Contact Scale (adapted from Islam & Hewstone, 1993). The latter queried participants regarding the quality and quantity of contact with African Americans.

The results of this experiment generally replicated the first study. Participants interacting with Black confederates during a cooperative word-finding task exhibited greater threat responses and performed worse than participants interacting with White targets. In addition, we found that responses from the MRS and the MCPRS were not related to cardiovascular responses during the actual interaction with a Black partner. That is, participants' self-reported attitudes regarding African Americans in general were not related to their cardiovascular responses. However, among participants interacting with Black partners, intergroup contact was significantly related to participants' cardiovascular responses during the word-finding task (see Table 6.1). More historical contact with African Americans was associated with greater VC, greater CO, and lower TPR—indicating less threat—during an actual interaction with a Black partner. The correlations among intergroup contact and cardiovascular responses during interactions with White partners were not significant. Hence, we would speculate that as familiarity increased then uncertainty decreased, leading to overall decreases in demand evaluations, and hence less threat. These findings point to the important role that quality intergroup contact may have in ameliorating otherwise threatening intergroup interactions.

Social Comparisons with Black and White Partners. Social comparisons are often the inevitable consequences of cooperation. In our social interaction studies, the word-finding task allowed for the possibility for participants to compare their own performance with their partners' performance. Because of this inevitability, we carefully orchestrated the confederates' responses during the

TABLE 6.1. Correlations between Intergroup Contact and Cardiovascular Reactivity as a Function of Partner's Race

Cardiovascular Reactivity	Historical Contact with African Americans	
	Partner was White	Partner was Black
VC	-.16	.57**
CO	.07	.36 [†]
TPR	-.27	-.43*

[†]p < .10; *p < .05; **p < .01

cooperative tasks to represent a "typical" performance, thus maintaining equivalent perceptions regarding confederates' performance across race conditions. In a third study (Mendes, 2002), we set out to systematically examine the effects of upward and downward social comparisons and how the race of the comparison other may exacerbate or ameliorate responses during the social comparisons.

The social comparison literature offers several plausible predictions regarding how race of the comparison other might interact with comparison direction (Brewer & Weber, 1994; Major, Sciacchitano, & Crocker, 1993; Wills, 1991). Wills (1991) argued that, although not typically pursued, comparisons with outgroup members can have profound implications on affective and behavioral consequences of social comparisons (cf. Brewer & Weber, 1994; Major et al., 1993; Wills, 1991). Based on our previous intergroup studies we reasoned that comparisons with Black partners would be more threatening than White partners and that upward comparisons would be more threatening than downward comparisons. Thus we predicted two additive main effects such that we would observe more threat when the comparison partner was Black versus White and more threat when the comparison was upward versus downward.

To test the interplay of race of the comparison other with comparison direction, we modified our social interaction paradigm slightly. After introducing the "participants," the experimenter explained to them that they were matched on age, major, GPA, and SAT scores. After a baseline physiological recording period, the participant was instructed how to play the word-finding task and was told to find as many words as possible in two minutes. Following the task the participant was advised how many valid words he/she had found and was instructed to enter that number into the computer. The computer then appeared to communicate with another computer and after a minute a list of abbreviations was presented on the computer monitor that consisted of ostensible rankings of the participant, the current confederate, and past participants. In the upward comparison conditions, of the 38 abbreviations listed the participant was ranked 29th and the confederate was ranked 8th. The downward comparison condition switched the two rankings.

Following a rest/recovery period, the rooms containing the participant and confederate were connected, and the dyad was instructed to complete a second word-finding task cooperatively for a monetary incentive based on their joint performance. After giving final instructions, but before beginning the task, we obtained pre-task evaluations of demands and resources. During performance of the task, we further manipulated comparison direction by modifying the speed at which the confederate performed the task. Confederates who were ranked higher than the participant (the upward comparison condition) performed twice as fast as the participant. That is, if the participant took 8 seconds to find a word, the confederate took 4 seconds. For the downward comparison condition, confederates performed half as fast as the participant. That is, if the participant

took 8 seconds, the confederate waited 16 seconds to say the word. Following completion of the cooperative task, we obtained post-task ratings of perceivers' positive and negative affect (PANAS; Watson, Clark, & Tellegen, 1988).

The results of this study were generally consistent with our previous ones. That is, we again observed a main effect for race of the confederate such that participants interacting with Black targets exhibited cardiovascular responses consistent with threat, whereas participants interacting with White targets exhibited challenge responses. Also, consistent with other social comparison studies not manipulating race (Mendes et al., 2001), we observed a main effect for comparison direction, such that upward comparisons resulted in more threat and downward comparisons resulted in more challenge. The additivity of these main effects supported our prediction that perceivers exhibited greater challenge responses during downward social comparisons with White compared to Black targets, and greater threat during upward social comparisons with Black compared to White targets.

Consistent with the previous studies, the same apparent dissociations between self-reported attitude measures and emotional/motivational measures were observed. Participants' self-reported ratings of targets were more positive for Black than White partners, and participants reported greater positive affect when interacting with Black partners compared to participants interacting with White partners. However, in this study, some self-report measures were generally consistent with the cardiovascular findings. Our pre-task evaluations of demands and resources were consistent with the cardiovascular findings. That is, participants interacting with Black compared to White confederates were more likely to evaluate the demands of the situation to be greater than their personal resources to cope.

Feedback from Black versus White Evaluators. The fourth experiment examined the extent to which positive or negative evaluations by a same-race or different-race partner would affect challenge and threat responses (Mendes, McCoy, Major, & Blascovich, 2002, Study 1). Again, we employed White and Black confederates. We allowed the participant to view the other "participant" (the confederate) via a video monitor to confirm they did not know each other. In this study we did not allow for face-to-face meetings. Participants were told they had been randomly assigned to the "performer" condition and their partner (the confederate) was randomly assigned to the "evaluator" condition. The participants were further instructed that they would be delivering a speech on "Why I make a good friend" that the other participant would be evaluating. Following the speech the participant received a rating form, ostensibly from the evaluator, that contained either positive or negative social feedback (i.e., how much they would like to be the participant's friend). Following the participant's review of the evaluation form, we connected the recording rooms so that the dyad could hear each other and instructed them how to play the

word-finding game. After playing the word-finding game for four minutes, participants completed the post-task survey that allowed for participants' ratings of the confederates.

Results from this study revealed a main effect for feedback: positive feedback was associated with greater performance and more challenge responses, whereas negative feedback resulted in worse performance and threat responses. Also, a main effect for race of the evaluator was observed. Consistent with the three previous studies, participants interacting with Black evaluators exhibited more threat responses than participants interacting with White evaluators. In addition, performance was significantly better with White evaluators than with Black evaluators. Similar to the previous studies, we again observed participant self-report ratings of evaluators that were inconsistent with their physiological and behavioral data, though consistent with our other intergroup studies. Participants who interacted with Black partners rated them more positively than participants who interacted with White partners.

Summary of Intergroup Studies

As described above, we have conducted many other experiments within the intergroup context beyond pairings comparing the effects of Black versus White confederates. Consistent with the finding that historical contact with the interaction partner's group moderates challenge and threat responses, we typically find that when the outgroup member is "unusual" or novel in some way (e.g., an attractive woman with a large port-wine stain birthmark or a Chinese woman with a thick South Carolina accent), the more likely participants will exhibit threat during the social interaction. Thus, we believe experience and contact are implicated as the likely mechanisms through which evaluations of demands and resources, most likely via uncertainty and knowledge, are affected.

The four intergroup studies that we described here converge on a basic finding: among non-Black perceivers, Black partners engender more cardiovascular responses consistent with threat and poorer performance than the same interactions with White partners. In addition, we found that perceivers' self-reported ratings of the partner (e.g., how likable, intelligent, hard-working, etc.) indicate that participants interacting with Black partners evaluate them more positively than participants interacting with White partners. Related to this finding, in the social comparison study, we found that participants interacting with Black partners reported more positive affect than did participants who cooperated with White partners.

Similar to the dissociations between the covert emotion-oriented measures and the overt measures that we observed, Vanman and colleagues (1997) found that participants rated Black targets as more likable than White targets even though facial EMG indicated more negative affect toward the Black targets. Also, Phelps and colleagues (2000) found that although amygdalar activity was

correlated with other implicit measures of racial bias (implicit associates test and startle-blink), it was not correlated with explicit measures of racial attitudes (e.g., Modern Racism Scale).

Collectively, these studies demonstrate the utility of covert physiological measures for the study of intergroup interactions. The lack of convergence between the covert measures (i.e., physiological responses) and the overt measures (i.e., self-report responses) points to the possibility that external pressures to appear nonprejudiced may overcome any motivation on the part of interactants to express their true beliefs and feelings (Dunton & Fazio, 1997). We believe this disjunction between covert and overt measures demonstrates the inherent difficulties in the study of intergroup relations. As demonstrated in our four studies described here (and other studies), participants' overt, more controlled self-report responses can differ quite dramatically from their covert, less controlled responses (i.e., physiological responses).

META-ANALYSIS OF OUR INTERGROUP STUDIES

We performed a meta-analysis of the data obtained from the four studies to examine the extent to which the various dependent variables were related to each other. This method provides increased reliability and enables us to address several important points related to studying emotion-oriented responses during intergroup interactions. First, we can determine the nature of the relationships of the various dependent variables to each other. Specifically, we can examine the relationship between the emotional/motivational responses (as measured by cardiovascular responses indicating challenge and threat) and self-reported attitude responses and then examine how the direction and magnitude of the relationships differ between responses obtained from intragroup versus intergroup interactions. Also, if behavior is the "gold-standard" we can assess which measures are the best predictors of behavior. To address these points and other questions, we organized the results of our meta-analysis within a multi-method framework.

To conduct the meta-analysis, we first calculated all of the intercorrelations within each study and then averaged the correlations to provide an overall indication of the magnitude and direction of the relationships of the various measures. We then calculated confidence intervals around those correlations to determine their stability and difference from zero. Importantly, we calculated these intercorrelations separately for participants who had interacted with White partners versus Black partners.

The four studies shared three categories of measures: physiological, behavioral, and self-report. For physiological variables, we used cardiac (averaging correlations from VC and CO) and vascular (TPR) ones. For a behavioral measure, we used performance on the word-finding task—specifically, the num-

of accurate words identified during the word-finding task. Self-report ratings included an index of how positively the partner was rated and an indication of how stressful the task was (a proxy variable for re-appraised task demands). In the social comparison study, we also obtained pre-task evaluations of demands and resources and post-task ratings of positive and negative affect (ANAS). We included the intercorrelations from these measures as well, although confidence intervals could not be calculated. The average intercorrelations from participants interacting with White partners are presented in Table 6.2a and the intercorrelations from participants interacting with Black partners are presented in Table 6.2b.

Relationships between Physiological and Behavioral Measures: Less Controlled with Less Controlled

Comparing physiological and behavioral responses among participants interacting with either White or Black partners, we observed similar magnitude and direction of the correlations. That is, for both groups of participants the greater the cardiac responses the better the performance (White: $r = .18$; Black: $r = .19$), and the lower the vascular responses the greater the performance (White: $r = -.19$; Black: $r = -.17$). These intercorrelations indicate that cardiovascular responses consistent with challenge were correlated with better performance. Hence, we observed the predicted relationship between the less controlled measures regardless of the race of the interaction partner.

Relationships between Physiological and Self-Report Attitude Measures: Less Controlled with More Controlled

We observed a very different pattern of responses from the one described above when we compared the intercorrelations between physiological responses and self-report attitude ratings. Among participants interacting with White partners, the more positively they rated their partner, the greater the cardiac responses ($r = .20$) and the lower the vascular responses ($r = -.15$). This is consistent with the idea that self-reported positive traits of the partner are associated with more positive physiological responding (i.e., challenge). In contrast, participants interacting with Black partners exhibited a different pattern of responding. Among this group the more positively participants rated their partner the lower the cardiac responses ($r = -.20$) and the higher the vascular responses ($r = .11$), a directional pattern consistent with threat.

If participants were merely responding positively to all Black partners then we would have observed no relationship between physiological responses and self-report responses. However, the oppositional relationship found indicates that participants were distorting their self-reported responses in a systematic way when interacting with a Black partner; that is, the greater the threat the

Table 6.2a. Means of Intercorrelations from Intergroup Studies—Partner Was White

Dependent Variables	1. Cardiac	2. Vascular	3. Performance	4. Partner Ratings	5. Stress	6. Positive Affect	7. Negative Affect	8. Demands
Physiological								
1. Cardiac								
2. Vascular	-.16 (-.11, -.21)							
Behavioral								
3. Performance	.18 (.15, .21)	-.19 (-.11, -.27)						
Self-Reports								
4. Partner Ratings	.20 (.13, .27)	-.15 (-.11, -.19)	.17 (.14, .21)					
5. Stress	-.27 (-.18, -.36)	.12 (.10, .14)	-.31 (-.25, -.37)	.21 (.18, .24)				
Affect ^a								
6. Positive	.19	-.11	.14	.04	-.30			
7. Negative	-.22	.26	.00	.02	.58	-.30		
Evaluations ^a								
5. Demands	-.31	.16	-.11	.22	.32	-.19	.03	
5. Resources	.14	-.08	.04	.04	-.16	.30	.04	-.31

TABLE 6.2b. Means of Intercorrelations from Intergroup Studies—Partner Was Black

Dependent Variables	1. Cardiac	2. Vascular	3. Performance	4. Partner Ratings	5. Stress	6. Positive Affect	7. Negative Affect	8. Demands
Physiological								
1. Cardiac								
2. Vascular	-.19 (-13:-25)							
Behavioral								
3. Performance	.19 (12:26)	-.17 (11:23)						
Self-Reports								
4. Partner Ratings	-.20 (-9:33)	.11 (5:17)	.01 (-20:22)					
5. Stress	-.11 (1:-33)	.02 (-13:17)	-.21 (-18:-24)	.08 (-1:17)				
Affect ^a								
6. Positive	.17	-.17	.17	.24	.07	.13	.30	-.31
7. Negative	-.18	.07	.23	.30	.28		-.22	
Evaluations ^a								
5. Demands	-.21	-.01	.32	.40	.31	.00		
9. Resources	-.01	-.18	-.15	-.31	.00	.16		

Note: Means reported were obtained from averaging the intercorrelations of the major dependent variable from the four intergroup studies reported in this chapter, except where noted. Confidence intervals (95%) appear to the right of the means in parentheses with the decimals excluded and lower and upper levels separated by colons.

^aThe correlations using Affect and Evaluations are from one study—Social Comparison study.

more positively participants rated their partner. One explanation is that participants interacting with Black partners were compensating verbally for their experienced emotion. That is, participants experiencing the most threat may be more motivated to distort their controlled verbal responses for self-presentation purposes than those experiencing little or no threat, possibly due to the guilt associated with their negative state. This is similar to the notion of "prejudice with compunction" (Devine, Monteith, Zuwerink, & Elliot, 1991). Furthermore, this finding is consistent with the idea that self-report ratings may be more affected by deliberate distortions than less controlled measures.

The relationship between the physiological responses and the self-reported stress ratings were lower in magnitude when participants interacted with outgroup members than with ingroup members. For participants who interacted with White partners the correlation between physiological responding and post-task stress was $-.27$ for cardiac and $.12$ for vascular. This is consistent with the prediction that more stress would be associated with less cardiac and greater vascular responding (the threat pattern). However, among participants interacting with Black partners the correlations with cardiac responses and stress were of lower magnitude, but in the same direction ($r = -.11$), and vascular and stress were not correlated ($r = .02$).

This general pattern was also observed with performance and self-report ratings. Among participants interacting with White partners the more they reported agreement with their partner having positive traits and the lower their reported stress, the better their performance ($r = .17$ and $r = -.31$, respectively). In contrast, participants interacting with Black partners showed no relationship between their ratings of their partner and performance ($r = .01$), and a lower magnitude of relationship between performance and stress ($r = -.21$), than observed with participants paired with White partners.

The intercorrelations including subjective self-ratings of positive affect provide some confidence in the use of self-report measures. Among the intercorrelations between physiological responses and perceivers' reports of their own positive affective state, the same general pattern emerged for participants interacting with White and Black partners. On average, participants who reported more positive affect exhibited greater cardiac activity (White: $r = .19$; Black: $r = .17$) and lower vascular activity (White: $r = -.11$; Black: $r = -.17$), providing evidence that positive affect of perceivers is associated with more challenge physiological reactivity. However, the intercorrelations using negative affect and cardiovascular responses did yield modest correlations in the expected direction among participants interacting with White partners (cardiac: $r = -.22$; vascular: $r = .26$), but the same magnitude of relationships were not observed among the participants paired with Black partners (cardiac: $r = -.18$; vascular: $r = .07$). Thus, it would appear that participants might be less inclined to report veridical experiences that are negative in nature within an intergroup setting, but more inclined to report veridical positive feelings.

Relationships among Self-Report Measures

Finally, some interesting relationships are noted among self-report measures. We observed significant correlations between positive affect and evaluations of demands and resources when the partner was White, but small or nonsignificant correlations when the partner was Black. In contrast, when the partner was Black we observed significant correlations with negative affect and evaluations, and no relationships when the partner was White. Thus, positive affect was associated with coping evaluations when the partner was White, and negative affect was associated with coping evaluations when the partner was Black. However, these data are from only one study and thus should be interpreted cautiously.

INTERPRETATIONS AND FINAL COMMENTS

Many theorists have hypothesized that negative emotions such as anxiety, stress, and threat underlie the negative or awkward nature of intergroup encounters (Gaertner & Dovidio, 1986; Gundykunst, 1984; Stephan & Stephan, 1985, 2000). However, for a variety of reasons, the precise natures of these negative reactions to intergroup contact have proven difficult to identify because of measurement problems. Various concerns of interactants may inhibit or distort self-reported attitude responses within intergroup contexts, particularly if the reactions are negatively valenced (Guglielmi, 1999). Additionally, the discrepancy between expressed and felt reactions may operate below conscious awareness (Greenwald & Banaji, 1995).

Our multi-method framework identifies associations and dissociations of various types of dependent measures as a function of the interaction partner's race. Overall, we found that physiological responses and behavioral (performance) responses were correlated in the predicted direction regardless of whether perceivers' partners were White or Black. However, perceivers' self-report ratings of their partners were not consistently correlated with the physiological responses and the performance responses. When the partner was White, participants' physiological responses and ratings of their partner were significantly correlated with each other in the expected direction. That is, the more positively they rated their partner the more challenge reactivity they exhibited.

However, we anticipated that we would not observe the same relationship when the partner was Black because of the pervasive finding across our intergroup studies that Black partners were consistently rated more positively than White partners even though Black partners engendered more threat reactivity than White partners. If all of the participants interacting with Black partners rated their partner's attributes with the highest point value, ceiling effects would obfuscate any linear relationship between self-reports and physiological responses, thus we would have obtained a zero correlation. Instead, we observed

a significant relationship in the opposite direction than we observed when the partner was White. The more positively participants rated their Black partner the more threat they exhibited physiologically. We are hesitant to provide an interpretation of this finding other than to comment that several factors may be operating to facilitate more distortion of the self-reports at higher levels of negative physiological states. Whether this oppositional pattern is a function of the participants' guilt or shame associated with their negative physiological state or due simply to participants who are more threatened having more reason to dissemble remains to be investigated.

Although the results of our research could be construed as indicating the invalidity of more overt controlled responses (such as self-reports), we would argue that covert, less consciously controlled and more consciously controlled or implicit measures might simply relate to different aspects of intergroup encounters. For example, responses from overt measures might predict more deliberate or orchestrated responses, such as approaching or helping. In a similar vein, covert measures might predict more reflexive responses such as distancing. Focusing on disentangling and identifying the predictive nature of covert and overt measures in different contexts will likely be an important and integral part of future research examining intergroup emotions and relations.

REFERENCES

- Blascovich, J. (2000). Using physiological indexes of psychological processes in social psychological research. In H. T. Reis & C. M. Judd (Eds.), *Handbook of research methods in social and personality psychology* (pp. 117-137). New York: Cambridge University Press.
- Blascovich, J., & Katkin, E. S. (1993). Psychological stress testing in coronary heart disease. In J. Blascovich & E. S. Katkin (Eds.), *Cardiovascular reactivity to psychological stress and disease* (pp. 27-45). Washington, DC: American Psychological Association.
- Blascovich, J., & Kelsey, R. M. (1990). Using electrodermal and cardiovascular measures of arousal in social psychological research. *Review of Personality and Social Psychology*, 11, 45-73.
- Blascovich, J., & Mendes, W. B. (2000). Challenge and threat appraisals: The role of affective cues. In J. Forgas (Ed.), *Feeling and thinking: The role of affect in social cognition* (pp. 59-82). Paris: Cambridge University Press.
- Blascovich, J., Mendes, W. B., Hunter, S. B., & Lickel, B. (2000). Stigma, threat, and social interactions. In T. Heatherton, R. Kleck, M. R. Hebl, & J. G. Hull (Eds.), *Stigma* (pp. 307-333). New York: Guilford Publications.
- Blascovich, J., Mendes, W. B., Hunter, S. B., Lickel, B., & Kowai-Bell, N. (2001). Perceiver threat in social interactions with stigmatized others. *Journal of Personality and Social Psychology*, 80, 253-267.
- Blascovich, J., Mendes, W. B., Hunter, S. B., & Salomon, K. (1999). Social "facilitation" as challenge and threat. *Journal of Personality and Social Psychology*, 76, 68-77.
- Blascovich, J., & Tomaka, J. (1996). The biopsychosocial model of arousal regulation. *Advances in Experimental Social Psychology*, 28, 1-51.
- Brewer, M. B., & Weber, J. G. (1994). Self-evaluation effects of interpersonal versus intergroup social comparison. *Journal of Personality and Social Psychology*, 66, 268-275.
- Cacioppo, J. T., Tassinary, L. G., & Bernston,

- G. G. (2000). Psychophysiological science. In J. T. Cacioppo, L. G. Tassinary, & G. G. Bernston (Eds.), *Handbook of psychophysiology* (2nd ed., pp. 3–26). New York: Cambridge University Press.
- Charles, C. Z. (2000). Neighborhood racial-composition preferences: Evidence from a multiethnic metropolis. *Social Problems*, 47, 379–407.
- Devine, P. G. (1989). Stereotypes and prejudice: Their automatic and controlled components. *Journal of Personality and Social Psychology*, 56, 5–18.
- Devine, P. G., Evett, S. R., & Vasquez-Suson, K. A. (1996). Exploring the interpersonal dynamics of intergroup contact. In R. M. Sorrentino & E. T. Higgins (Eds.), *Handbook of motivation and cognition, Vol. 3: The interpersonal context* (pp. 423–464). New York: Guilford Press.
- Devine, P. G., Monteith, M. J., Zuwerink, J. R., & Elliot, A. J. (1991). Prejudice with and without compunction. *Journal of Personality and Social Psychology*, 60, 817–830.
- Devine, P. G., Plant, E. A., & Buswell, B. N. (2000). Breaking the prejudice habit: Progress and obstacles. In S. Oskamp (Ed.), *Reducing prejudice and discrimination* (pp. 185–208). Mahwah, NJ: Lawrence Erlbaum.
- Dienstbier, R. A. (1989). Arousal and physiological toughness: Implications for mental and physical health. *Psychological Review*, 96, 84–100.
- Dunton, B. C., & Fazio, R. H. (1997). An individual difference measure to control prejudiced reactions. *Personality and Social Psychology Bulletin*, 23, 316–326.
- Gaertner, S. L., & Dovidio, J. F. (1986). The aversive form of racism. In J. F. Dovidio & S. L. Gaertner (Eds.), *Prejudice, discrimination, and racism* (pp. 61–89). Orlando, FL: Academic Press.
- Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review*, 102, 4–27.
- Guglielmi, R. S. (1999). Psychophysiological assessment of prejudice: Past research, current status, and future directions. *Personality and Social Psychology Review*, 3, 123–157.
- Gudykunst, W. B. (1984). *Communicating with strangers: An approach to intercultural communications*. Reading, MA: Addison-Wesley.
- Islam, M. R., & Hewstone, M. (1993). Dimensions of contact as predictors of intergroup anxiety, perceived out-group variability, and out-group attitude: An integrative model. *Personality and Social Psychology Bulletin*, 19, 700–710.
- Jost, J. T., & Banaji, M. R. (1994). The role of stereotyping in system-justification and the production of false consciousness. *British Journal of Social Psychology*, 33, 1–27.
- Lazarus, R. S., DeLongis, A., Folkman, S., & Gruen, R. (1985). Stress and adaptational outcomes: The problems of confounded measures. *American Psychologist*, 40, 770–779.
- Lazarus, R. S., & Folkman, S. (1991). The concept of coping. In A. Monat & R. S. Lazarus (Eds.), *Stress and coping: An anthology* (3rd ed., pp. 189–206). New York: Columbia University Press.
- LeDoux, J. (1998). Fear and the brain: Where have we been, and where are we going? *Biological Psychiatry*, 44, 1229–1238.
- Major, B., Sciacchitano, A. M., & Crocker, J. (1993). In-group versus out-group comparisons and self-esteem. *Personality and Social Psychology Bulletin*, 19, 711–721.
- Mendes, W. B. (2002). *Effects of social comparisons on cardiovascular reactivity: An examination of classic and contemporary moderators*. Unpublished doctoral dissertation, University of California, Santa Barbara, Santa Barbara, CA.
- Mendes, W. B., Blascovich, J., Lickel, B., & Hunter, S. (2002). Challenge and threat during social interactions with White and Black men. *Personality and Social Psychology Bulletin*, 28, 939–952.
- Mendes, W. B., Blascovich, J., Major, B., & Seery, M. D. (2001). Challenge and threat during upward and downward social comparisons. *European Journal of Social Psychology*, 31, 477–497.
- Mendes, W. B., McCoy, S., Major, B., & Blascovich, J. (2002). *Effects of race and evaluative feedback on challenge and threat reactivity*. Manuscript in preparation.
- Obrist, P. A. (1981). *Cardiovascular psychophysiology: A perspective*. New York: Plenum Press.
- Phelps, E. A., O'Connor, K. J., Cunningham, W. A., Funayama, E. S., Gatenby, J. C., Gore, J. C., & Banaji, M. R. (2000). Performance on indirect measures of race evaluation predicts amygdala activation. *Journal of Cognitive Neuroscience*, 12, 729–738.
- Sidanius, J., & Pratto, F. (1993). The inevitability of oppression and the dynamic of social dominance. In P. M. Sniderman & P. E. Tetlock (Eds.), *Prejudice, politics, and the American dilemma* (pp. 173–211). Palo Alto, CA: Stanford University Press.
- Sidanius, J., & Veniegas, R. C. (2000). Gender and race discrimination: The interactive nature of disadvantage. In S. Oskamp (Ed.), *Reducing prejudice and discrimination* (pp. 47–69). Mahwah, NJ: Lawrence Erlbaum.
- Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology*, 69, 797–811.
- Stephan, W. G., & Stephan, C. W. (1985). Intergroup anxiety. *Journal of Social Issues*, 41, 157–175.
- Stephan, W. G., & Stephan, C. W. (2000). An integrated threat theory of prejudice. In S. Oskamp, & W. Crano (Eds.), *Reducing prejudice and discrimination* (pp. 23–45). Mahwah, NJ: Lawrence Erlbaum.
- Tomaka, J., Blascovich, J., Kelsey, R. M., & Leitten, C. L. (1993). Subjective, physiological, and behavioral effects of threat and challenge appraisal. *Journal of Personality and Social Psychology*, 18, 616–624.
- Tomaka, J., Palacios, R., Schneider, K. T., Colotla, M., Concha, J. B., & Herrald, M. M. (1999). Assertiveness predicts threat and challenge reactions to potential stress among women. *Journal of Personality and Social Psychology*, 76, 1008–1021.
- Vanman, E. J., Paul, B. Y., Ito, T. A., & Miller, N. (1997). The modern face of prejudice and structural features that moderate the effect of cooperation on affect. *Journal of Personality and Social Psychology*, 73, 941–959.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54, 1063–1070.
- Wilder, D. A. (1993). The role of anxiety in facilitating stereotypic judgments of out-group behavior. In D. M. Mackie & D. L. Hamilton (Eds.), *Affect, cognition, and stereotyping: Interactive processes in group perception* (pp. 87–109). San Diego, CA: Academic Press.
- Wills, T. A. (1991). Similarity and self-esteem in downward comparison. In J. Suls & T. A. Wills (Eds.), *Social comparison: Contemporary theory and research* (pp. 51–78). Hillsdale, NJ: Lawrence Erlbaum.
- Wiseman, R. L. (Ed.). (1995). *Intercultural communication theory*. Thousand Oaks, CA: Sage Publications.
- Wyer, N. A., Sherman, J. W., & Stroessner, S. J. (2000). The roles of motivation and ability in controlling the consequences of stereotype suppression. *Personality and Social Psychology Bulletin*, 26, 13–25.