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Autonomy and Control in Dyads: Effects on Interaction Quality and Joint Creative Performance

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Abstract

Two studies examined interaction quality and joint performance on two creative tasks in unacquainted dyads primed for autonomy or control orientations. It was hypothesized that autonomy-primed dyads would interact more constructively, experience more positive mood, and engage the task more readily, and as a result these dyads would perform better. To test this, Study 1 primed orientation and explored verbal creative performance on the Remote Associates Task (RAT). In Study 2, dyads were primed with autonomy and control orientation and videotaped during two joint creative tasks, one verbal (RAT) and one nonverbal (charades). Videotapes were coded for behavioral indicators of closeness and task engagement. Results showed that autonomy-primed dyads felt closer, were more emotionally and cognitively attuned, provided empathy and encouragement to partners, and performed more effectively. The effects of primed autonomy on creative performance were mediated by interpersonal quality, mood, and joint engagement.

Keywords

autonomy, dyad, relationships, performance, creativity

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As individuals live and work together in everyday life contexts, the quality of their interactions varies considerably. To some interactions people bring more openness and energy, whereas to others they may be more constrained or less forthcoming. Although a large number of personal and contextual factors may contribute to the quality of any given interaction, in the present article we focus on autonomous and controlled orientations as a significant factor molding the responsiveness, positivity, and productivity of people interacting in the performance of a shared task.

Autonomy and control orientations are described by *self-determination theory* (SDT; Ryan & Deci, 2000) as two distinct ways that individuals orient toward and regulate behavior. An *autonomy orientation* refers to a tendency to initiate behavior based on interest and self-endorsed values; it is accompanied by a sense of choicefulness, endorsement, and ownership of one's behavior. In contrast, *control orientation* refers to the tendency to orient toward how one "ought" to behave according to external or internal directives and is experienced as a sense of coercion and pressure. Research thus far has largely focused on effectiveness of behavior as a function of autonomous and controlled orientations at the individual level (e.g., Hodgins, Koestner, & Duncan, 1996; Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004). Yet most human behavior occurs in social contexts, with influence from imagined others or in the presence of others. Thus, it is important to consider the influence of orientation on interpersonal interactions and joint performances.

In the present project, we focused on performance reflective of collaborative creativity because the advantages of autonomy for relating and joint performance should be most pronounced on tasks that require creativity rather than only past knowledge or rote learning. Creative performance involves the identification and integration of previously unrelated concepts through broad attention and flexible thinking (Harris, 1972; Roe, 1953; Rouse, 1986; Sternberg, 1999). We propose that an autonomy orientation facilitates creative thinking because it encourages more flexibility and openness in the present moment. Flexible thinking results in creative accomplishments, particularly when both personal resources and interpersonal supports are present (Woodman & Schoenfeldt, 1990). Partners engaging in

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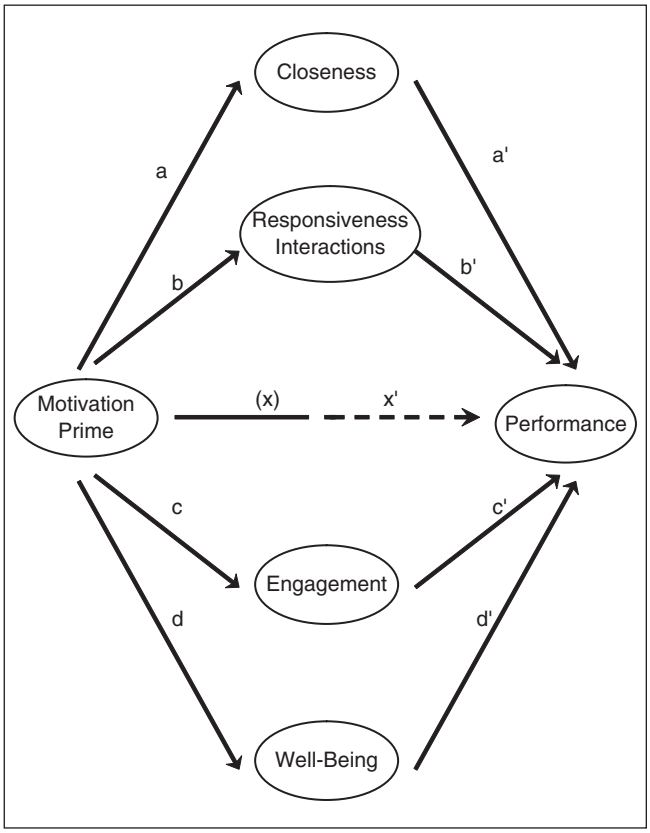

Figure 1. Model predicting creative performance from autonomy or control and mediated by closeness, partner responsiveness, task engagement, and well-being

cooperative creative tasks perform more highly when characteristics such as openness and flexibility are present *interpersonally,* that is, primarily occurring between partners, as well as *intrapersonally*, that is, primarily occurring internally in each partner. Specific processes that have been implicated as predictive of performance success can therefore be distinguished by whether they are interpersonal or intrapersonal. These processes are also broadly associated with a sense of openness elicited by autonomy (e.g., Hodgins et al., in press; Weinstein & Hodgins, 2009). Both types of processes—interpersonal (specifically, closeness and responsiveness to partners) and intrapersonal (specifically, task engagement and well-being)—are discussed later. See Figure 1 for a representation of the full model, wherein orientation predicts interpersonal (Paths a and b) and intrapersonal (Paths c and d) processes, and these in turn predict creative performance (Paths a′-d′).

Indicators of Interaction Quality

Interpersonal processes. An important interpersonal process predicting task success is partner *closeness,* as revealed in partner perceptions or in behaviors exhibited during task-focused activity. Previous findings in intimate relationships show that closeness between partners is important for a wide array of healthy relationship characteristics, including openness to self-disclosure (Hornstein, 1985), trust (Anderson, DePaulo, & Ansfield, 2002), and the ability of one partner to influence the other (Nielson, 1998). Partner closeness therefore is key to effective and satisfying interactions.

The second interpersonal process important for dyadic task success is *partner responsiveness.* Past research shows that autonomous individuals are less avoidant and more engaged, trusting, and caring of their intimate partners (e.g., Knee, Lonsbary, Canevello, & Patrick, 2005). Though seminal work by Feeney (2007) suggests a link between responsiveness to partner needs and partner autonomy or self-initiation, partner-responsive behaviors, including emotional and cognitive attunement, provision of empathy, and provision of encouragement, have not been directly examined in relation as outcomes of autonomy. These indicators have been shown to facilitate engaging adaptively, flexibly, and effectively in interpersonal situations (Batson & Coke, 1981; Eisenberg & Strayer, 1990; Tickle-Degnen & Rosenthal, 1987), which leads to successful interactions (Howe, 1987; Tyler & Lind, 1992).

Intrapersonal processes. Autonomous partners who take interest in a shared task are more likely to *engage in* the task fully and effectively because they are personally invested in the task and outcomes. Indeed, past research shows that autonomy is a powerful predictor of task engagement (e.g., Sansone, Weir, Harpster, & Morgan, 1992), which leads to higher task commitment (Eveleth & Pillutla, 2003). Engagement in collaborative tasks, in turn, may be expected to relate to dyadic creative performance because creative solutions involve task persistence (e.g., Fiore, Schooler, Linville, & Hasher, 2001). Finally, another process at the intrapersonal level that should influence creative task performance is *positive mood.* The intrapersonal functioning associated with autonomy should be associated with better mood, which should facilitate performance in autonomous task-centered interactions. Consistent with this, past studies demonstrate that happy people are more capable of the broad thought, flexibility, and openness necessary for effective performance and, indeed, are more creative than unhappy people (e.g., Isen, 1987).

The Present Studies

We examined the effect of primed autonomy and control orientations on interaction quality and task performance of unacquainted undergraduate dyads as they engaged in collaborative creative tasks. Examining collaborations under specific conditions in the laboratory and focusing on stranger interactions help identify process-related outcomes not influenced by past experience in order to isolate the role of interaction quality in joint task performance. In Study 1, dyads were randomly assigned to receive one of two orientation primes (autonomy or control) or an orientation-free, neutral

prime. Participants in each dyad received the same priming intervention. Following the prime, they jointly engaged in a creative task, the Remote Associates Task (RAT). The RAT requires collaborative creative problem solving, which should be especially benefited by the openness, flexibility, and spontaneity underlying receptive dyadic interaction.

A second study exposed dyads to the same orientation primes (autonomy or control), but dyads engaged in two creative performance tasks. As in Study 1, the RAT assessed creative thinking in a cognitive, verbal task. The second task was a game of charades, which assessed creative performance in an entirely nonverbal task. The use of two very different tasks allowed greater generalizability about the effect of orientation on relational and task performance processes.

We hypothesized that, relative to dyads primed with control orientation, those primed with autonomy orientation would: (a) have better collaborative performance on verbal (Studies 1 and 2) and nonverbal (Study 2) creative tasks (Figure 1, Path x), (b) be more responsive to their partners when interacting and would experience higher felt closeness (Paths a and b), and (c) engage the task more and incur more well-being from it (Paths c and d), and (d) the quality of dyadic interactions, task engagement, and well-being in the task (Paths a′-d′) would mediate the effect of primed orientation on creative task performance (Path x′).

Study 1

Method

Participants. One hundred and sixteen students agreed to participate; 4 were excluded because they knew each another, resulting in $N = 112$ (73 women, 39 men; M age = 20, range = 18-24). Three percent were Black, 5% Hispanic, 18% Pacific Islander or Asian, 69% Caucasian, and 5% identified as another ethnicity.

Measures

Autonomy, control, and neutral prime (Hodgins, Brown, & Carver, 2007). Autonomy, control, and neutral orientations were primed with a 30-item sentence scramble task (15 orientation, 15 filler). Participants use five words to construct grammatically correct four-word sentences. Orientation-specific words were: *choiceful, autonomous, opportunity, options, choose, freedom, autonomous, decided,* and *preference* (autonomy) and *must, should, ought, required, obligated, coerced, obey, compulsory, constrained, necessary,* and *pressured* (control). Sample sentences include "feel are choiceful I usually" (autonomy) and "so behavior my they restrict" (control). The neutral prime included only neutral terms such as *chair* and *lamp*.

RAT (Mednick, 1962). Participants received three words and were asked to find a fourth related word (e.g., *stop–petty–sneak*, solution word is *thief*). The ability to make such remote (as opposed to expected or predictable) associations is central to creative thought (see more on this in Gruszka & Necka, 2002; Mednick, 1962). The RAT is widely used as a creativity measure because it requires cognitive flexibility, divergent thinking (e.g., Isen, 1987; Silvia & Phillips, 2004), and persistence (Fiore et al., 2001). In other words, the RAT operationalizes creativity in terms of distal and novel associations that are not immediately associated with the presented stimuli (Isen, 1987). Among other applications, the RAT enhances creative potential in training programs (Necka, 1992), measures creative outcomes of positive mood (e.g., Isen, 1987), and demonstrates effects of domain knowledge on creativity (Wiley, 1997). In our dyadic RAT, performance also required verbal communication between partners. The present study RAT included 11 possible associative strings (e.g., "bear, tree top, cake = black"; "envy, golf, beans = green"). Pilot testing using self-reports of 35 students indicated that the items ranged from moderate (3.2 on a scale of 1 = *not at all difficult* to 5 = *very difficult*) to very difficult (4.7). Dyads provided final answers jointly but indicated which partner first thought of each association; performance was assessed separately by attributing correct responses to the partner first suggesting it ($M = 4.21$, range = 1-8).

Orientation prime manipulation check. To assess autonomy during the tasks, we adapted the self-regulation questionnaire (Ryan, Rigby, & King, 1993). In relation to each task, participants rated eight items (four autonomy, four control); examples are "I engaged in [charades/RAT] because . . . I had no choice" (control) and "because it was personally important to me to do so" (autonomy; 1 = *not at all true,* 7 = *very true*). The four items for each orientation type were averaged (autonomy, $M = 4.11$; control, $M = 3.15$); final scores were derived as autonomy minus control. Reliabilities were αs = .73 and .76, respectively.

Interpersonal Mediators

Empathy. Empathy was measured after each task with nine items adapted from the Balanced Emotional Empathy Scale (BEES; Mehrabian, 1969). On 7-point scales (1 = *strongly disagree,* 7 = *strongly agree*) participants rated items including "the emotions of the other participant easily rubbed off on me" and "I was trying to put myself in the other participant's shoes" (α = .86).

Closeness. Participants responded to an eight-item relatedness subscale of the Intrinsic Motivation Inventory (IMI; McAuley, Duncan, & Tammen, 1989), assessing closeness between participants (α = .75). The answers ranged from 1 (*not at all*) to 7 (*very much*) and included items such as "I really doubt this person and I would ever be friends" (reverse scored) and "I feel distant to this person" (reverse scored). Higher scores reflect more closeness.

Intrapersonal Mediators

Task engagement. Task engagement was measured using a separate subscale from the IMI (see Ryan, Koestner, &

Deci, 1991). Participants responded on the same 7-point scale to items including "I put a lot of effort into this" and "I didn't put much energy into this" (reverse scored). Reliability was acceptable, α = .69.

Positive and Negative Mood Schedule (PANAS; Watson, Clark, & Tellegen, 1988). PANAS assessed mood immediately after priming and after the task. Participants reported how much "right now" or "when engaging in the RAT" they felt each of 20 positive (e.g., *alert, proud, strong*; αs = .77-.80) and negative (e.g., *scared, nervous, distressed*; αs = .76-.79) adjectives on 7-point scales (1 = *very slightly or not at all,* 7 = *extremely*).

Procedure. Pairs of previously unacquainted students participated in a single lab session. They completed initial surveys in separate rooms and were primed with a randomly assigned orientation prime (autonomy, control, or neutral). Participants were then taken to another room where they completed the RAT together. They were then separated again to complete post-RAT surveys that assessed mood, empathy, engagement, closeness, and RAT autonomy and control.

Results and Discussion

Primary Analyses

Data analytic strategy. Analyses were conducted with hierarchical linear modeling (HLM; Bryk & Raudenbush, 1992). Dyad gender (see the following discussion) and condition were defined at Level 2 (dyad level). Unconditional models including only the dependent variables compared the variance between couples (Level 2) to that within couples (Level 1), using variance–covariance patterns at each level, to determine whether sufficient variability exists at both levels to justify using HLM. This is typically done for each dependent variable to justify HLM analyses in each (see Raudenbush & Bryk, 2002, for more on this). Intraclass correlation (ICC) derived from these models showed that across outcomes, 41%-62% of the total variance occurred between persons. Given the substantial variance accounted for at each level, full models were tested that included predictor variables selected by conceptual considerations. Across analyses, the general Level 1 equation was:

$$0V_{ij} = B_{oj} + B_1X_{1ij} + B_2X_{2ij} + e_{ij},$$

where $0V_{ij}$ is the outcome variable, B_{oj} reflects the average value of the outcome, Xs are the corresponding independent variables at each level, and e_{ij} represents Level 1 error. At Level 2, we tested effects of both condition and gender with the following Level 2 equation:

$$B_{oj} = G_{oo} + G_{01}X_{1j} + G_{02}X_{2j} + G_{03}X_{3j} + u_{oj},$$

where G_{oo} reflects the day-level intercept for an average person; G_{01} and G_{02} refer to the effects of prime condition, which was dummy coded for use in HLM (first contrast: 1 = *autonomy,* 0 = *neutral*; second contrast: 1 = *control,* 0 = *neutral*); G_{03} reflects the slope for gender, and u_{oj} is error at Level 2. As Bryk and Raudenbush (1992) recommended, Level 1 variables were centered on individual rather than sample means, and Level 2 variables were sample-mean centered.

Table 1. Study 1 Correlations Between Outcomes for the Remote Associates Task

	Empathy	PA	NA	Engage	Perform
Close	.42**	.24*	–.26**	.22*	.37**
Empathy		.21*	–.15	.10	.26**
PA			–.34**	.19*	.20*
NA				–.23*	–.24*
Engage					.41**

Pearson bivariate correlations compare all major study variables of interest, $n = 116$. PA = positive affect; NA = negative affect.
*$p < .05$. **$p < .01$.

Gender. Gender was constructed to reflect dyad pairings. Because there were few male–male dyads, these were combined with male–female dyads. Therefore, dyad gender was coded 1 if both members were male ($n = 7$) or if the dyad consisted of one male and one female member ($n = 25$), and 2 if both members were female ($n = 24$). Gender was controlled for in all analyses for this study and Study 2. For both studies, results did not change (either in direction or significance) as a function of controlling for gender.

Mediation analyses. We hypothesized that interaction and personal processes would mediate the relation between orientation and creative performance. The present study explored this model by testing mediators: empathy (indicative of partner responsiveness), closeness, well-being, and task engagement (illustrated by Figure 1). To test mediation, overall well-being was derived from the standardized negative mood composite subtracted from the standardized positive mood composite ($r = –.34$). Mediation analyses were conducted with three models, as recommended by Kenny, Korchmaros, and Bolger (2003) for lower level mediations in HLM. We first assessed the effect of prime on performance. Second, we tested the effects of prime on mediators, followed by the effects of mediating constructs on performance. Finally, we examined the impact of prime (at Level 2) on performance when controlling for the Level 1 mediators. The Level 1 model for the third and fourth steps was:

$$\text{performance}_{ij} = \beta_{0j} + \beta_{1j}(\text{empathy}) + \beta_{2j}(\text{closeness}) + \beta_{3j}(\text{engagement}) + \beta_{4j}(\text{well-being}) + r_{ij}.$$

Preliminary analyses. Participants did not differ on major study variables as a function of either age or ethnicity (*p*s > .12), so these were not included in primary analyses. Table 1 presents correlations betweens study outcomes; Table 2 presents means for major study variables, separated by condition. These descriptions show that, overall, autonomy-primed participants performed more highly, were more

Table 2. Means for Major Study 1 and Study 2 Variables

	M values			*t* values	
Outcomes	Control	Autonomy	Neutral	Contrast 1	Contrast 2
RAT Study 1				Aut–Neu	Con–Neu
Closeness	2.27	3.53	2.98	2.52*	–3.10**
Empathy	3.71	4.60	4.22	2.48*	–2.75**
Positive mood	2.01	3.44	2.90	2.01*	–2.12*
Negative mood	3.14	1.92	2.42	–3.01**	4.69**
Engagement	3.63	5.19	4.30	3.68**	–1.99*
Performance	3.14	6.22	5.12	2.42*	–3.15**
RAT Study 2				Aut–Con	
Closeness	–0.41	0.69		2.50*	
Emotional attunement	0.99	1.83		3.20**	
Cognitive attunement	–0.55	1.04		2.35*	
Empathy	3.99	4.78		2.79**	
Encouragement	0.30	1.41		2.09*	
Positive mood	–0.70	1.59		2.13*	
Negative mood	1.35	–0.94		–2.30*	
Engagement	–0.75	0.99		3.13**	
Performance	2.99	5.80		2.37*	
Charades Study 2				Aut–Con	
Closeness	–0.53	0.73		2.26*	
Emotional attunement	0.85	1.91		3.26**	
Cognitive attunement	–0.68	1.22		2.52*	
Empathy	3.65	4.59		2.64**	
Encouragement	0.27	2.24		2.54*	
Positive mood	–0.99	1.71		2.24*	
Negative mood	1.41	–0.88		–2.44*	
Engagement	–0.98	1.12		2.43*	
Performance	7.12	12.03		2.70**	

For Study 1, significance values reflect comparisons of each prime with the neutral condition; for Study 2, significance values reflect comparisons of autonomy and control conditions. In Study 2, closeness, positive and negative mood, and engagement reflect composite scores. Emotional and cognitive attunement reflect relative scores. RAT = Remote Associates Task; Aut–Neu = autonomy–neutral; Con–Neu = control–neutral; Aut–Con = autonomy–control.
*$p < .05$. **$p < .01$.

connected with each other, and had higher well-being while participating in the task.

Manipulation check. Analysis of the three groups showed an overall effect of prime, $F(2, 110) = 6.61$, $p < .01$. Group comparisons showed higher autonomy among autonomy-primed participants than control-primed participants, $t(75) = 2.89$, $p < .01$, or neutral-primed participants, $t(73) = 2.26$, $p < .05$. Control-primed participants were lower on autonomy than neutral-primed participants, $t(75) = –2.15$, $p < .05$.

Quality of interaction. Controlling for gender, autonomy-primed dyads experienced more self-reported *closeness* than did neutral-primed participants, $t(53) = 2.52$, $p < .05$, whereas control-primed participants reported less closeness than neutral-prime participants, $t(53) = –3.10$, $p < .01$. Additionally, autonomy-primed dyads reported higher *empathy* than neutral dyads, $t(53) = 2.48$, $p < .05$, whereas control-primed dyads reported lower empathy than neutral dyads, $t(53) = –2.75$, $p < .01$. Both models had a significant amount of variance left unexplained, meaning that the Level 1 and Level 2 predictors did not entirely explain how empathic and close participants felt after the task and that other predictors may be considered to explain these outcomes, $\sigma s = 0.99$ and 1.31, $ps < .01$.

Benefits to participants and task. Results controlled for mood directly after priming to rule out any direct effects of prime on participant mood when predicting mood after the collaborative task. Accounting for mood and gender, autonomy-primed dyads reported higher positive mood during the task, $t(52) = 2.01$, $p < .05$, and less negative mood, $t(52) = –2.12$, $p < .05$, compared to neutral-primed dyads. In contrast, control primed dyads reported less positive mood, $t(52) = –3.01$, $p < .01$, and more negative mood, $t(52) = 4.69$, $p < .01$, compared to neutral dyads. Variance remained for both models, $\sigma s = .49$ and .58, $ps > .01$. Additionally, models examining effects of condition on task engagement showed an effect for condition, such that autonomy-primed dyads were more engaged in the RAT than neutral-primed dyads, $t(53) = 3.68$, $p < .01$, whereas control-primed dyads reported less

engagement than neutral-primed dyads, $t(53) = -1.99$, $p = .05$ ($\sigma = 0.75$, $p < .01$).

Dyad Performance

Performance. Results for the RAT showed that autonomy-primed participants solved more problems correctly than did neutral-primed dyads, $t(53) = 2.42$, $p < .05$, whereas control-primed dyads associated fewer terms, $t(53) = -3.15$, $p < .01$ ($\sigma = 3.14$, $p < .01$).

Performance mediated. We hypothesized that the relation between orientation and creative performance would be mediated by empathy (indicative of responsive interpersonal interactions), interpersonal closeness, personal well-being, and task engagement. Tests described previously showed that autonomy and control priming each predicted performance (Path c on Figure 1), closeness (Path a), empathy (Path b), and task engagement (Path d), as compared to neutral priming, controlling for mood after priming. Also consistent with analyses presented previously, autonomy versus neutral prime predicted relative positive mood, $t(53) = 2.45$, $p < .05$, and control versus neutral prime negatively predicted mood, $t(53) = -4.18$, $p < .01$. In addition, performance was predicted by closeness, $t(49) = 4.16$, $p < .01$; empathy, $t(49) = 2.49$, $p < .05$; mood, $t(49) = 2.85$, $p < .01$; and task engagement, $t(49) = 2.64$, $p < .05$, at Level 1. Importantly, when mediating constructs were included in the model, neither condition contrast predicted performance, ts(49) = 0.99 and 1.05, ps > .05. Significant variance remained in the models, $\sigma = 132.20$, $p < .01$. Sobel's test (1982) supported marginal or significant indirect effects for the autonomy–neutral contrast through: closeness, $z = 2.15$, $p < .05$; empathy, $z = 1.76$, $p < .07$; mood, $z = 1.86$, $p < .06$; and task engagement, $z = 2.13$, $p < .05$. It supported the control–neutral contrast through: closeness, $z = 2.59$, $p < .05$; empathy, $z = 1.85$, $p < .06$; mood, $z = 2.36$, $p < .05$; and an indirect trend for task engagement, $z = 1.58$, $p = .10$.

Summary. Study 1 demonstrated that an autonomous orientation facilitated interpersonal closeness and empathy between unacquainted partners engaged in a collaborative, creative task, and it facilitated a sense of well-being and task engagement. Results also indicated that a control orientation independently hindered these intrapersonal and interpersonal processes. In part as a result of these processes, autonomy led to greater creativity among dyads, whereas control thwarted dyad creativity. A strength of the study is that creative task performance was assessed with an objective behavioral measure. However, a limitation is that the intrapersonal and interpersonal outcomes were assessed only with self-report.

Study 2

Study 2 aimed to replicate and extend Study 1 by assessing creative performance on two very different tasks and by examining behavioral indicators of mediating processes. Also, Study 1 established clearly that autonomy-primed dyads did better and control-primed dyads worse compared to neutral-primed dyads; thus, given the time-consuming nature of the dyadic procedure, Study 2 examined only relative differences between autonomy and control. Finally, additional covariates of biased responding and trait shyness were measured and statistically controlled to account for their demonstrated past effects on interpersonal and personal reactivity (e.g., Kashdan & Wenzel, 2005).

Method

Participants. One hundred and eighty-six students participated; 8 were excluded because they knew each another, leaving 178 (54 men, 124 women; *M* age = 20, range = 18-23). Five percent were black, 5% Hispanic, 17% Pacific Islander or Asian, 66% Caucasian, and 7% identified as another ethnicity.

Measures

Revised Cheek and Buss Shyness Scale (RCBS; Cheek & Melchior, 1985). The 20-item RCBS includes items such as "I feel tense when I'm with people I don't know well" and "I feel inhibited in social situations" (1 = *very uncharacteristic or untrue, strongly disagree* to 5 = *very characteristic or true, strongly agree*). Internal reliability was high in previous research ($\alpha = .94$; Melchior & Cheek, 1990) and in the current study ($\alpha = .90$).

Balanced Inventory of Desirable Responding (BIDR; Paulhus & John, 1998; Paulhus & Reid, 1991). The 60-item BIDR measures the tendency to present oneself favorably and has shown pervasive effects on self-reported and situational responding (see Robinson, Shaver, & Wrightsman, 1991). Self-deceptive enhancement ($\alpha = .72$), impression management ($\alpha = .68$), and self-deceptive denial ($\alpha = .77$) subscales were averaged for total BIDR.

Measures were used as in Study 1 including the autonomy and control primes and the manipulation check to assess autonomy ($M = 4.25$) and control ($M = 3.61$). A relative orientation score was derived for the manipulation check for each task (RAT αs = .79-.81, charades αs = .83-.84). As in Study 1, the BEES assessed empathy during both tasks (RAT $\alpha = .83$, charades $\alpha = .85$).

Creative Performance Measures

Remote Associates Task. The RAT assessed verbal communication and collaborative creativity among partners. As in Study 1, dyads provided final answers jointly; performance was assessed separately by attributing correct responses to the partner first suggesting it ($M = 4.36$, range = 1-9). To attain performance measures, coders recorded the number of correct responses by each participant, Cohen's kappa measure of interrater reliability was high, $\kappa = 1.00$.

Charades. Charades is a nonverbal communication game involving one person silently acting out words or concepts as others attempt to guess the correct answer; it relies on creative thought and requires cognitive flexibility and openness (Eysenck, 1994; Foster, 1971). Charades is similar to RAT in requiring novel concepts and experimenting with novel solutions. Charades differs in that it requires creative *nonverbal* communication, whereas RAT rests on creativity with *verbal knowledge*. In our version, dyads received four sets of 10 terms (e.g., *potholder, microscope,* and *donut*); partners had two turns each acting and guessing. Guessers continued until actors indicated they were correct or gave up. There were numerous repeated and incorrect suggestions; therefore, performance was scored as the number of correct guesses for each dyad ($M = 8.56$, range = 1-19; $\kappa = 1.00$).

Mediators

PANAS (Watson et al., 1988). The PANAS assessed mood immediately after priming and after each task. Participants reported how much "right now" or "when engaging in the RAT/charades" they felt each of the 20 positive (αs = .79-.83) and negative (αs = .81-.84) adjectives on 7-point scales (1 = *very slightly or not at all,* 7 = *extremely*).

Perceived partner mood. Using the PANAS, participants reported their partner's perceived mood; reliability was acceptable (αs = .65-.81). Mood discrepancy scores were calculated by subtracting ratings from the partner's own mood ratings, separately for positive affect and negative affect. Discrepancy scores were standardized, averaged, and reversed so that lower scores reflect less discrepancy between partners' and own mood assessments, that is, higher emotional attunement to partner.

Recall of contributions. For each task, participants recalled contributions made by partners and self. For the RAT, the number of recalled contributions ranged from 1 to 15 (self $M = 5.7$, other $M = 5.0$). For charades, recalled contributions ranged from 1 to 11 (self $M = 4.1$, other $M = 4.4$). Cognitive attunement to partner was calculated as: (other's actual score – recalled other's score)/(self actual scores – self recalled score). Using this calculation, partners' actual scores were controlled for to ensure that final scores reflected cognitive attunement and not differential partner performance; self-recalls were included to control for quality of memory.

Partner closeness. Closeness was measured as physical distance while sitting (Vohs, Mead, & Goode, 2006). In a "debriefing room" at the end of the study, dyads retrieved stacked chairs and pulled them up for debriefing; chair distance inversely reflected partner closeness (range = 9.2-21.4, $M = 12.8$ in.).

Procedure. Participants completed web-based individual difference measures; on the following day, previously unacquainted dyads attended a single lab session. They completed initial surveys in separate rooms, including the same randomly assigned prime (autonomy or control) and were brought together for RAT instructions with two examples. Dyads were videotaped working jointly for 8 min and recording answers with one pencil on one sheet. In separate rooms, partners then completed post-RAT surveys of self and partner mood, recalled contributions, empathy, and RAT orientation.

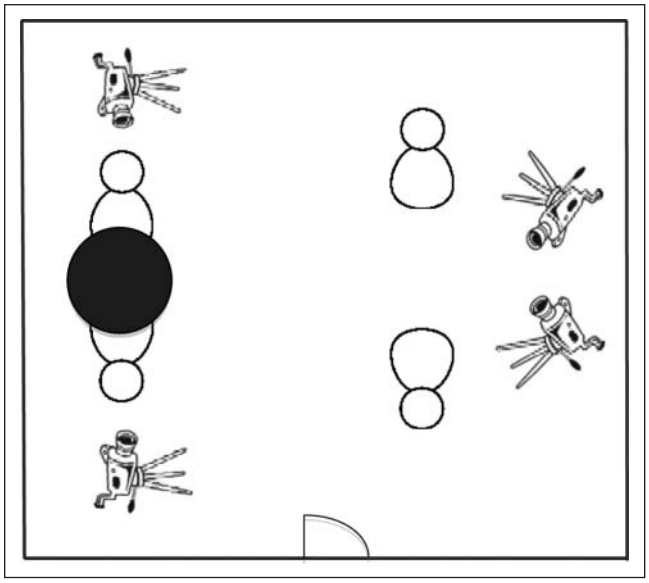

Figure 2. Layout of lab, including camera positioning, for both the Remote Associates Task and charades

Dyads were reunited and videotaped while playing four 2-min segments of charades (total 8 min); each partner acted and guessed for two segments. Participants completed post-charade self and partner mood, contribution recall, and empathy measures in separate rooms and were brought together for debriefing. In another room, they were asked to unstack and place chairs so they could hear the debriefing being read. Distance of chair placement was an inverse measure of dyad closeness.

Videotape Coding of Task Performance. Two cameras videotaped front views of each partner during the RAT as dyads sat at a small table; partners stood facing one another during charades while cameras recorded each from an angle (see Figure 2 for layout). Because the RAT and charades involve different behaviors, different coding was used. For example, eye contact and forward or backward leaning, which predict interaction quality (Argyle & Dean, 1965; Bazzini, Stack, Martincin, & Davis, 2007; Dörnyei, 1997; Mehrabian, 1969), could be coded during the seated RAT but not during the standing charades. Two trained judges unaware of condition coded videotapes independently.

Closeness behavior (RAT only). *Leaning forward* is associated with dyadic rapport (e.g., Mehrabian, 1969) and closeness (Guerrero, 2004). Leaning was coded for every minute on a scale from –2 (*lean back*) to 0 (*upright posture*) to +2 (*lean forward*) and averaged (interrater reliability, Cohen's

kappa, κs = .74-.77). *Eye contact,* which reflects closeness (e.g., Argyle & Dean, 1965; Exline & Winters, 1965), was rated for every minute (1 = *none,* 5 = *constant*) and averaged across the interaction (κs = .68-.70). Finally, *behavioral synchronicity,* another measure of dyadic intimacy reflecting the extent to which partners imitate one another's nonverbal behaviors (Bernieri & Rosenthal, 1991; Tickle-Degnen & Rosenthal, 1987; Wallbott, 1995), was coded for each minute by viewing partners' videotapes side by side and recording similarity in behavior from 1 (*not at all similar*) to 5 (*very similar*), κs = .75-.88, and averaging across minutes.

Closeness behaviors (RAT and charades). Laughter indicates intimacy and closeness (Bazzini et al., 2007), and *joint laughter*, in particular, reflects partner consensus and closeness (Cheng, 2003). Joint laughter occurrences were summed for each task (RAT, $M = 0.50$, range = 0-4, $\kappa = .99$; charades, $M = 2.09$, range = 0-7, $\kappa = .99$). *Celebrations of partners' success* (e.g., "great job!" "yay!" and "very nice!") reflect closeness in interpersonal interaction (Dörnyei, 1997); celebrations were counted (RAT, $M = .57$, range = 0-3, $\kappa = .96$; charades, $M = 1.55$, range = 0-6, $\kappa = .94$).

Closeness composites were constructed separately for RAT and charades by averaging standardized coded behaviors relevant to each task (RAT, $\alpha = .82$; charades, $\alpha = .88$).

Encouragement. Responsive dyad members provide encouragement (Tyler & Lind, 1992). Encouraging statements (e.g., "so close!" "almost there," and "I bet we are going to do a great job") were counted separately for RAT ($M = 0.65$, range = 0-5, $\kappa = .93$) and charades ($M = 1.38$, range = 0-9, $\kappa = .91$). Encouragements are differentiated from celebrations by their intent to bolster performance by increasing partner confidence rather than to celebrate an achieved success.

Coded well-being. Coders used PANAS indicators to estimate positive affect and negative affect for each partner during each interaction minute; minutes were averaged for each task (κs = .70-.76; αs across minutes = .74-.79). Scores were standardized and averaged with their standardized self-reported counterpart (αs for self-reported and coded mood = .77 and .81).

Task engagement (RAT). Three types of comments were counted during the RAT: off-task comments, suggestions, and disagreements. When fully engaged in a task, participants do not talk about unrelated topics; thus, *off-task comments* (e.g., "It's warm in here" and "I'm tired today"), which reflect lower engagement, were coded ($M = 1.56$, range = 0-7, $\kappa = 1.0$). Higher task-related behavior reflects engagement (e.g., Vansteenkiste et al., 2004); thus, the number of *suggestions* during the RAT was coded ($M = 3.38$, range = 1-18, $\kappa = .96$). *Disagreements* indicate willingness to state opinions in the service of attaining a correct solution and are expected in open and honest interactions (Hodgins, 2008). Examples of coded disagreements include "I don't think that's right" and "You sure about that?" Disagreements were summed for each partner ($M = 3.38$, range = 0-10, $\kappa = .98$).

Task engagement (charades). Coded charades behaviors included *numbers of actor strategies and guesser suggestions*. Similar to RAT suggestions, strategies and guesses reflect participation and engagement. Although strategies and guesses are inherent to charades, the number of attempts varied; higher numbers reflect engagement and enthusiasm (guesses: $M = 17.5$, range = 2-35, $\kappa = 1.00$; strategies: $M = 13.4$, range = 2-24, $\kappa = .98$).

Results and Discussion

Primary Analyses

Data analytic strategy. When outcomes did not differ between dyadic partners, ordinary least squares (OLS) regression analyses were used to test prime effects. However, most outcomes required accommodations for nesting within dyad and were therefore more appropriate for HLM. Dyad gender and condition were defined at Level 2 (similar to Study 1; dyad level), whereas shyness and biased responding were defined at Level 1 (person level). ICC derived from unconditional models showed that across outcomes, 39%-57% of the total variance occurred between persons, whereas 43%-61% of the variance occurred within persons. Gender and other covariate effects are presented in Table 3.

Gender. Gender reflected dyad pairings and was coded 1 if both members were male ($n = 6$) or if the dyad consisted of one male and one female member ($n = 42$), and 2 if both members were female ($n = 41$).

Mediation analyses. We hypothesized that the relations between orientation and creative performance would be mediated by interaction processes, including partner responsiveness, closeness, well-being, and task engagement (see Figure 1). To test mediation, we grouped variables into responsiveness and well-being constructs based on theoretical and empirical considerations. Interpersonal responsiveness was constructed from standardized emotional attunement, cognitive attunement, empathy, and encouragement ($\alpha = .71$). Mood was derived from the standardized negative mood composite subtracted from the standardized positive mood composite ($r = –.25$). Mediation analyses were conducted as in Study 1,

Preliminary analyses. Participants did not differ on major study variables as a function of either age or ethnicity (ps > .10), so these variables were not included in primary analyses. Table 4 presents correlations between outcomes for the RAT and charades. Presented on the diagonal, correlations between similar constructs measured during the RAT and during charades ranged from $r = .55$ to $r = .74$, indicating that measures reflected similar underlying constructs during both tasks. Table 2 presents means for major study variables, separated by condition. These descriptions show that, overall, autonomy-primed participants performed more highly, were more connected, and had higher well-being while participating in both tasks.

Table 3. Effects of Covariates on Separate Outcomes

	Gender		Shyness		Biased responding	
	B	*t*	B	*t*	B	*t*
RAT outcomes						
Closeness	2.67	2.93**	–0.19	–1.20	0.18	0.59
Emotional attunement	0.62	1.73†	–0.23	–1.51	0.48	1.53
Cognitive attunement	–0.23	–0.30	–0.25	–0.69	0.46	0.82
Empathy	0.27	1.78†	–0.02	–0.12	0.17	1.26
Encouragement	0.35	1.90†	–0.42	2.12*	0.23	1.35†
Positive mood	0.25	1.82†	–0.27	–1.94#	0.33	1.95#
Negative mood	–0.24	–0.95	0.11	0.83	–0.15	–1.46
Engagement	0.92	3.54**	–0.19	–1.63	0.10	0.61
Performance	1.65	2.84**	–0.57	–2.31*	0.53	1.42
Charades outcomes						
Closeness	0.24	1.60	–0.38	0.35	0.09	0.72
Emotional attunement	3.07	2.66**	–1.50	–2.25*	–0.11	–1.24
Cognitive attunement	1.75	1.44	0.18	0.29	–1.73	–2.08*
Empathy	0.42	1.83†	0.08	0.58	–0.03	–0.16
Encouragement	0.51	0.97	–0.70	–2.44*	–0.20	–0.60
Positive mood	0.32	1.17	0.02	0.09	0.60	2.77**
Negative mood	–0.63	2.96*	0.50	2.37*	–0.13	–0.88
Engagement	0.64	2.77**	–0.12	–0.98	0.00	0.02
Performance	3.65	2.98**	–0.87	–1.34	1.02	1.25

Effects are derived from full hierarchical linear modeling (HLM) models tested in Study 2. Shyness and biased responding were tested at Level 1, $df = 164$; gender was tested at Level 2, $df = 85$. RAT = Remote Associates Task.
†$p < .09$. #$p < .06$. *$p < .05$. **$p < .01$.

Table 4. Correlations Between Outcomes for RAT (Above Diagonal), Charades (Below Diagonal), and Between RAT and Charades Outcomes (Diagonal)

	Close	Emotion attune	Cognitive attune	Empathy	Encourage	PA	NA	Engage	Perform
Close	**.67****	.48**	.35**	.36**	.38**	.37**	–.33**	.42**	.44**
Emotion attune	.42**	**.74****	.49**	.32**	.39**	.24**	–.16*	.27**	.31**
Cognitive attune	.31**	.48**	**.68****	.17*	.34**	.13*	–.11	.19*	.17*
Empathy	.37**	.34**	.15*	**.59****	.41**	.21*	.16*	.18*	.29**
Encourage	.33**	.26**	.18*	.27**	**.55****	.36**	.10	.27**	.16*
PA	.45**	.23**	.12	.15*	.12	**.71****	–.25**	.26**	.21*
NA	–.27**	–.13*	–.09	–.17*	–.14*	–.26**	**.63****	–.24**	–.32**
Engage	.23**	.24**	.21*	.17*	.26**	.29**	–.21*	**.66****	.47**
Perform	.41**	.27**	.22**	.20*	.27**	.35**	–.29**	.41**	**.56****

Pearson bivariate correlations compare all major study variables of interest, $n = 186$. RAT = Remote Associates Task; PA = positive affect; NA = negative affect.
*$p < .05$. **$p < .01$.

Results for RAT

Manipulation check. Confirming the effectiveness of the prime, during the RAT higher autonomy was reported by autonomy- than control-primed dyads, $t(164) = 4.10$, $p < .01$.

Quality of interaction. A closeness score was constructed from eye contact, forward leaning, behavioral synchronicity, joint laughter, and success celebrations. HLM analyses controlled for biased responding, shyness, and gender (see Table 4). Accounting for these covariates, more closeness behaviors were shown by autonomy-primed than control-primed dyads, $t(85) = 2.50$, $p < .05$ ($\sigma = 7.22$, $p < .01$). In addition, compared to control-primed dyads, autonomy-primed dyads demonstrated more *emotional attunement*, $t(85) = 3.20$, $p < .01$, and *cognitive attunement*, $t(85) = 2.35$, $p < .05$ (emotional attunement: $\sigma = 1.51$, $p < .01$; cognitive attunement: $\sigma = 2.97$, $p < .01$). Finally, autonomy-primed dyads reported higher *empathy*, $t(85) = 2.79$, $p < .01$, and provided more *encouragement*, $t(85) = 2.09$, $p < .05$. Significant variances remained for both (empathy: $\sigma = .06$, $p < .05$; encouragement: $\sigma = .24$, $p < .01$).

Benefits to participants and task. Analyses controlled for mood after priming to rule out direct effects of priming on mood: positive mood, $t(162) = 3.01$, $p < .01$, and negative mood, $t(162) = 3.23$, $p < .01$. Accounting for this, during the task, relative to control-primed dyads, autonomy-primed dyads reported higher positive mood, $t(83) = 2.13$, $p < .05$, and lower negative mood, $t(83) = -2.30$, $p < .05$ (σs = .44 and .49, respectively, ps > .01). In addition, autonomy-primed dyads were more engaged during charades, $t(85) = 3.13$, $p < .01$ ($\sigma = 0.26$, $p < .01$).

Dyad Performance

Performance. Relative to control-primed dyads, autonomy-primed dyads provided more correct RAT solutions, $t(85) = 2.37$, $p < .05$ ($\sigma = 1.29$, $p < .01$).

Performance mediation. We hypothesized that the effect of priming on creative performance would be mediated by interpersonal responsiveness (composed of emotional attunement, cognitive attunement, empathy, and partner encouragement), interpersonal closeness, personal well-being, and task engagement. Analyses controlled for mood after priming. As described previously, priming (independent variable) predicted performance (dependent variable), and closeness and task engagement (mediators). Also consistent with the preceding analyses, autonomy predicted composites for interpersonal responsiveness, $t(85) = 3.17$, $p < .01$, and mood, $t(83) = 2.23$, $p < .05$. Additionally, performance was predicted by closeness, $t(78) = 3.22$, $p < .01$; interpersonal responsiveness, $t(78) = 2.64$, $p < .01$; mood, $t(78) = 2.72$, $p < .01$; and task engagement, $t(78) = 4.82$, $p < .01$, at Level 1. When these were included in the model, condition no longer predicted performance, $t(78) = 1.36$, $p > .05$.[1] Significant variance remained, $\sigma = 163.20$, $p < .01$ (Model 1 variance = 150.93). Sobel's test (1982) supported the indirect effect for closeness, $z = 1.99$, $p < .05$; interpersonal responsiveness, $z = 2.03$, $p < .05$; mood, $z = 1.73$, $p < .08$; and task engagement, $z = 2.62$, $p < .01$.

Charades Results

Manipulation check. Supporting the priming effectiveness, autonomy-primed dyads reported higher autonomy while playing charades than control-primed dyads, $t(164) = 3.92$, $p < .01$.

Interaction quality. Closeness did not vary within dyad; thus, we used OLS analysis. Relative to control priming, autonomy priming predicted more behavioral closeness, $t(163) = 2.26$, $p < .05$.[2] In addition, autonomy-primed participants were more *emotionally attuned*, $t(85) = 3.26$, $p < .01$, and *cognitively attuned* to their partners, $t(85) = 2.52$, $p < .05$ ($\sigma = 0.03$, $p > .20$; $\sigma = 4.01$, $p < .01$). Finally, autonomy-primed participants reported more *empathy* after charades, $t(85) = 2.64$, $p < .01$, and provided more *encouragement* to partners, $t(85) = 2.54$, $p < .05$ ($\sigma = .39$ and $\sigma = .95$, both ps < .01).

Benefits to participants and task. Positive mood after the prime related to positive mood, $t(162) = 5.31$, $p < .01$, and negative mood after charades, $t(162) = 5.42$, $p < .01$. Relative to control-primed participants, autonomy-primed participants reported higher positive mood, $t(83) = 2.24$, $p < .05$, and lower negative mood, $t(83) = -2.44$, $p < .05$ (σs = .42-.62, ps < .01). As well, primed participants were more engaged while playing charades, $t(85) = 2.43$, $p < .05$ ($\sigma = 0.25$, $p < .01$).

Dyad Performance

Performance. Relative to control-primed dyads, autonomy-primed dyads guessed more terms correctly, $t(85) = 2.70$, $p < .01$. Significant variance remained in the model after accounting for condition and covariate effects, $\sigma = 6.04$, $p < .01$.

Performance mediation. The four mediators of RAT performance were examined for charades: closeness, interpersonal responsiveness (emotional attunement + cognitive attunement + empathy + encouragement), mood (positive mood – negative mood), and task engagement. Recall that condition predicted the dependent variable (performance) as well as two mediators (closeness and task engagement). Condition also predicted the two composites for testing mediation, interpersonal responsiveness, $t(85) = 4.10$, $p < .01$, and mood, $t(83) = 3.42$, $p < .01$. Additionally, performance was predicted by closeness, $t(78) = 3.95$, $p < .01$; interpersonal effectiveness, $t(78) = 2.79$, $p < .01$; task engagement, $t(78) = 3.40$, $p < .01$; and, marginally, mood, $t(78) = 1.92$, $p < .06$. When these were included in the model, the effect of condition on performance was no longer significant, $t(78) = 1.12$, $p > .05$, though variance remained, $\sigma = 164.40$, $p < .01$ (Model 1 variance = 162.42). Sobel's test was: closeness, $z = 1.97$, $p < .05$; interpersonal responsiveness, $z = 2.30$, $p < .05$; mood, $z = 1.68$, $p < .09$; and task engagement, $z = 3.40$, $p < .05$.

Chair distance. Chair distance was measured at the end of the study rather than during charades, so distance was analyzed separately. Also, chair distance did not vary within dyad and could not be analyzed with HLM, so parallel OLS analysis was conducted. Results showed that autonomy-primed dyads sat closer to one another than control-primed dyads, $t(164) = -3.21$, $p < .01$.

Summary. Results for both the RAT (a verbal creative task) and charades (a nonverbal creative task) show the benefits of an autonomous context. Dyads who were randomly assigned to an autonomous context exhibited more closeness behaviors, more empathy and encouragement of partners, and more cognitive and emotional attunement to each other, as indicated by memory for contributions and appraisals of partner mood. These indicators of interaction quality, in turn, mediated the effect of autonomy on creative dyadic performance.

General Discussion

Autonomy and Interpersonal Relating

The findings demonstrate that, relative to having a control orientation made salient, activated autonomy enhanced the

performance and interaction quality of previously unacquainted dyads as they engaged in two collaborative tasks. As predicted, autonomy-primed dyads related more constructively and positively during the creative tasks. Autonomous partners felt their interpersonal success, as they were emotionally closer according to self-reports (Study 1) and coded behavior (Study 2). In Study 2, autonomy-primed dyads were more likely to maintain eye contact, lean toward each other, and mirror each other during the RAT, and in both tasks they were more likely to laugh and celebrate each other's and mutual successes. Consistent with their closeness measured with coded behaviors, autonomy-primed dyads sat closer together at the end of Study 2, an implicit and unaware measure of their psychological closeness. Autonomy priming also increased responsiveness toward partners: Autonomy-primed dyads were more emotionally and cognitively attuned, empathic, and encouraging to one another.

The results for closeness are in line with previous studies showing that autonomy is associated with closeness among romantic partners (e.g., Blais, Sabourin, Boucher, & Vallerand, 1990; La Guardia, Ryan, Couchman, & Deci, 2000), but the current studies extend that finding in several ways. First, autonomy is linked to felt closeness even among strangers in a task-focused context. Hence, the result provides further confirmation for the compatibility of autonomy and relatedness (Hodgins et al., 1996). Second, the use of priming with unacquainted dyads allows the conclusion that autonomous context results in more closeness, a causal inference that is not possible in studies of self-selected romantic partners.

The present study is the first to demonstrate that autonomy increases responsiveness toward partners: Individuals whose autonomy was activated were more attuned to, empathic toward, and encouraging of partners. Beyond the laboratory stranger interactions studied here, this responsiveness should facilitate autonomous individuals in having more positive interpersonal experiences. Indeed, responsiveness might explain, in part, the higher well-being that autonomous individuals experience in day-to-day life (e.g., Lynch, LaGuardia, & Ryan, 2009).

In addition, autonomy-primed dyads experienced more positive and less negative mood during both the RAT and charades. Thus, those randomly assigned along with a stranger to do tasks in an autonomous context received the benefit of a more positive affective experience compared to unfortunate control-primed dyads. It is notable that even during charades, which most find fun and enjoyable, control priming limited positive mood and exacerbated negative mood. It suggests that affective experience is related less to *what* one does (i.e., the task) than to *how* one does it (i.e., the underlying orientation).

Autonomy and Task Behaviors

Autonomy-primed dyads were more engaged in the collaborative tasks, as shown by a greater number of task-related and fewer task-irrelevant behaviors. For example, autonomy-primed dyads made more guesses during the RAT and charades, and tried more strategies while acting charades. The creative nature of the tasks required going beyond application of knowledge and repetition of learned behavior; rather, success depended on flexible exploration of novel solutions. The engagement of autonomy-primed dyads supported flexible problem solving and enhanced performance so that autonomy dyads performed better according to objective criteria on both tasks. The finding suggests that the poor work productivity in groups that do not see the value of their contributions (Shepperd, 1993) might be related to the lack of engagement because of low autonomy and abundant control.

Defense and Interpersonal Processes

The purpose of the current studies was to examine primed autonomy and control orientations on collaborative interactions and resultant performance, specifically, collaborative creative performance. Autonomy (as compared to control) may be expected to influence such performance because this orientation facilitates active processing and flexible information organization by encouraging engaged and flexible attention (Grolnick & Ryan, 1987) while concurrently facilitating satisfying relationships (e.g., Knee et al., 2005).

Perhaps autonomy also facilitated these interpersonal and cognitive processes and control thwarted them because of the effects of each state on *defense*. Recent research shows that both autonomy and control orientations influence levels of *intrapersonal* defense (Hodgins, 2008; Hodgins & Knee, 2002). Autonomy, which orients individuals to their own interests and values, promotes volition and noncontingent and stable self-esteem. In contrast, control, which orients individuals to societal contingencies and demands, advances self-consciousness, fragile self-esteem, and quests for self- and other approval (see also Ryan, 1995). Thus, although autonomy-motivated individuals are free to attend to novel and interesting stimuli, associations, and interactions, control-motivated individuals may focus on maintaining the status quo, attaining approval, or avoiding shame or embarrassment. Research in support of this view shows that relative to primed control, autonomy causes participants to be less defensive: They show less self-serving attribution, self-handicapping, and desire to escape (Hodgins, Yacko, & Gottlieb, 2006), and they use less defensive emotion regulation (Weinstein & Hodgins, 2009). Defensiveness imbues experience with an unpleasant quality, but there is evidence that it also interrupts performance (Hodgins et al., in press), which it may have done in the present studies.

Motivational Approaches

The present results are derived from an SDT framework but speak to the impact of motivation in creative partner

interactions, which is relevant to other theories. For example, Higgins's (1987) *regulatory focus theory* proposes that individuals can be motivated either by ideal states (e.g., hopes, wishes) or ought states (e.g., duty, obligation). In SDT terms, ideal states might correspond to autonomy and ought states to control; thus, our orientation priming might have tapped these regulatory foci in some sense. However, autonomy reflects more than wishes or desires and can also be felt in terms of values or even duties, to the extent these are well integrated (Deci & Ryan, 2000). Additionally, control can go beyond the introjected sense of "ought" to reflect direct external regulation as well. Future work could examine how regulatory primes might parallel or depart from autonomy and control primes in predicting relationship-relevant outcomes.

Another theoretical approach that might inform the current studies is reactance theory, which would agree with an SDT viewpoint that control would thwart dyads (Brehm, 1966). However, reactance theorists might predict that the more autonomy is reduced, the more partners would move to reestablish freedom, perhaps involving reducing closeness to another. In contrast, in our results, the most interpersonally activating state is autonomy, not control. Thus, reactance theory would not account for compatibility of autonomy and relatedness demonstrated here.

Other theories propose that the most effective interpersonal conditions arise when individuals can control or relinquish control to others (interpersonal relations orientation; Schutz, 1958), expect pleasure and relaxation from others (Rubin, Perse, & Barbato, 1988), or have expectations that they can master or control the interpersonal interaction (Patterson, 1983). It would be interesting to consider in future research how autonomy and control might interact with these other theoretical approaches to predict collaborative behavior.

Goal Priming

Priming individuals with relationship representations has been shown to orient behaviors to those relationships and produce interpersonal goals consistent with those relationships (Fitzsimons & Bargh, 2003). As well, priming the name of a controlling significant other can lead to reactant pursuit of *opposite* goals (Chartrand, Dalton, & Fitzsimons, 2007). In priming autonomy or control, we may have inadvertently also primed representations associated with autonomous or controlled goal situations (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Troetschel, 2001) and the positive performance that can be induced by contexts that support autonomy (e.g., Vansteenkiste et al., 2004).

Studies have shown that priming unconscious orientation has similar effects to conscious goal shaping. For example, subliminal priming of cooperation produced increases in cooperation similarly to receiving explicit instructions to this end (Bargh et al., 2001). Priming orientation using sentence scramble may have had similar effects to those provided when individuals were explicitly asked to engage in cooperative tasks in an autonomous way or a controlled way. In this case, results were consistent with previous studies showing that environments that encourage autonomy compared to control facilitate interpersonal effectiveness (e.g., Weinstein & Ryan, 2010).

Creative Performance in Everyday Contexts

Dynamics of autonomy and control may be applied to understand creative performance in real-life contexts, including leadership and organizations. In particular, research suggests that managerial dyads and groups require both collaborative creativity and strategic communication (Lobert, Massetti, Mockler, & Dologite, 1995). Indeed, work groups have the potential to develop novel and adaptive solutions and move toward growth and productivity or, alternatively, to engage in disordered communication and inept decision making (Hambrick & Mason, 1984). Understanding the influence of autonomy and control orientations on workplace experience and interactions and their role in creative problem solving can improve organizational effectiveness.

Orientation is particularly critical in groups that focus on creative and innovative tasks, such as technology, arts, and sciences. Individuals in these groups can be expected to potentiate one another's creativity when both partners are autonomously engaged and enthusiastic about the project. Likewise, we expect that orientation is critical in psychotherapy, which relies on collaborative contributions from client and therapist in working toward shared goals (e.g., Norcross, 2002). In this case, accurate communication and empathy in the therapeutic dyad, engagement in the process, and closeness are important determinants of a successful therapeutic relationship.

Limitations

The use of an experimental design with unacquainted partners is an important strength of the study because outcomes can be attributed to randomly assigned contexts. Yet in many real-life situations, relationship partners are not strangers, so in a sense, partners will bring with them their own primes. Nonetheless, we fully expect that the causal direction shown here operates in naturally occurring contexts, so that, for example, managers who establish autonomy-supportive work environments make it more likely that employees will interact positively and constructively and solve problems creatively on collaborative work projects.

This study had several additional limitations. First, participants were undergraduates and were disproportionately female; hence, the role of gender, education, and age in these processes will require further research. The samples were also from the United States and thus might not generalize across cultures. Lynch et al. (2009) showed recently that dyads

characterized by autonomy support were associated with more satisfying relationships and well-being across several cultural samples, but dyadic interactions were not directly examined. Furthermore, because of the absence of a neutral prime condition, Study 2 did not address whether autonomy improves interaction and performance, whether control thwarts them, or whether both occur. Study 1 suggested the latter interpretation, but the result remains to be replicated.

Despite these limitations, the present results showed that relative to control-primed dyads, autonomy-primed dyads interacted more positively and responsively. The quality of interpersonal relating, in turn, led to better performance on joint tasks that relied on creative and flexible thought and problem solving. It appears that orienting individuals toward autonomy and minimizing cues for control can improve the quality of interpersonal relating and allow collaborators to engage in joint tasks more creatively and successfully.

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Notes

1. Considering the correlational nature of the mediation data, we tested an alternative model in which performance mediated the effects on interpersonal and task-specific constructs (rather than vice versa, as proposed in the text). Mediation analyses were conducted predicting all closeness and task indicators from prime, followed by analyses controlling for performance. Results for both studies showed a significant main effect of prime on each indicator, $ps < .05$, which did not noticeably drop when controlling for performance, $ps < .05$. From these results we can conclude that the performance measure does not serve as a mediator for the effects of prime on closeness and task indicators.
2. To examine whether charades outcomes of interest were a direct result of the orientation manipulation or whether they were shaped by dyad experiences in the Remote Associates Task (RAT), we tested a mediation model wherein RAT experiences were responsible for charades outcomes. Analyses predicted each charades variable from the prime and mediated by the RAT outcomes simultaneously. Prime predicted closeness, $t = 2.33$; responsiveness, $t = 2.69$; mood, $t = 5.41$; task engagement, $t = 2.40$; and performance, $t = 2.72$, after controlling for the RAT, $ps < .05$. These results indicated a direct effect of prime on quality of interaction and task engagement when dyads played charades.

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