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## Power Moves: Complementarity in Dominant and Submissive Nonverbal Behavior

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Two studies examine complementarity (vs. mimicry) of dominant and submissive nonverbal behaviors. In the first study, participants interacted with a confederate who displayed either dominance (through postural expansion) or submission (through postural constriction). On average, participants exposed to a dominant confederate decreased their postural stance, whereas participants exposed to a submissive confederate increased their stance. Further, participants with complementing responses (dominance in response to submission and submission in response to dominance) liked their partner more and were more comfortable than those who mimicked. In the second study, complementarity and mimicry were manipulated, and complementarity resulted in more liking and comfort than mimicry. The findings speak to the likelihood of hierarchical differentiation.

Social interactions are filled with subtle behaviors that communicate much about the nature of the relationship (Argyle, 1988; Giles & Powesland, 1975; Goffman, 1959; Mehrabian, 1972; Patterson, 1983). Research has shown that even slight movements of the arm or of a facial muscle affect people's views of their interaction partners (for reviews, see Argyle, 1988; DePaulo & Friedman, 1998).

One aspect of interpersonal impression that appears to be affected by subtle and nonintrusive nonverbal behavior is the dominant–submissive dimension of interpersonal perception (Argyle, 1988; Ellyson & Dovidio, 1985; Exline, Ellyson, & Long, 1975; Gifford, 1991; Henley, 1977; Keating, 1985; Knutson, 1996). Simple changes in posture are accompanied by differences in perceived dominance. When people expand themselves and take up a lot of space, they are perceived as dominant, whereas when they constrict themselves and take up little space, they are perceived as submissive (Argyle, 1988; Aries, Gold, & Weigel, 1983; Eibl-Eibesfeldt, 1989; Gifford, 1991; Mehrabian, 1972; Spiegel & Machotka, 1974; Weisfeld & Beresford, 1982). Postural expansion can be achieved by moving one's limbs out from oneself (as in arms or legs akimbo), and constriction is achieved by drawing the limbs in or crossing them over one's body and curving the torso inwards. At the very least, these "power moves" communicate the actor's likely status position to observers, probably because postural expansion occurs more frequently among people who are high status and constriction more frequently among people who

are low status (Eibl-Eibesfeldt, 1975). Although research has established the effects these movements have on impressions of an actor's status, far less is known about how these behaviors influence behavioral responses of others and whether they affect the nature of relationships with onlookers.

There are at least two forms of systematic effects of these displays on the behaviors of others. First, it is possible that observers respond to these behaviors with assimilative behaviors. People may respond to others who display dominance with dominant displays of their own and respond to submissive behaviors with mutual submission, a pattern we will refer to as *postural mimicry*. Second, it is possible that an observer could respond to dominant and submissive behaviors with contrasting behaviors. Dominant displays could invite submissive responses and submissive displays could invite dominant behavior, a pattern we will refer to as *postural complementarity*. The first goal of this article is to determine which of these responses is most likely.<sup>1</sup>

Establishing the typical pattern of responses will elucidate processes involved in defining the relationship between two individuals, and could provide insight into the ways in which status positions are negotiated in relationships. If, in a given relationship, people tend to complement, it suggests that they are prone to differentiate along the dominant–submissive dimension and that this relationship will likely become hierarchical. If instead they mimic, it suggests that they strive toward similarity on the hierarchy dimension and that the relationship can be defined as oriented toward either mutual submission or domination.

The second goal of this article is to examine how these behavioral responses affect the relationship between the two actors. In

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<sup>1</sup>One can imagine a number of additional possible responses. For example, people might accommodate, that is, mimic high-status behaviors but not low-status behaviors (Giles & Powesland, 1975; Gregory & Webster, 1996). Or, people might consistently express dominance with the hopes of always being in a dominant position in the relationship. Finally, people's dominant and submissive behavior might be a reflection of their personality rather than a function of what interaction partners do (Gifford, 1991). Our data will speak to these possibilities as well as to mimicry and complementarity.

general, people within a dyad can display behavior that is either similar or different in terms of dominance and submission. We will examine whether this affects the relationship. Specifically, we will test whether postural mimicry or postural complementarity leads to greater affection between people and more comfort in the relationship.

Research in social psychology on the attractiveness of similarity, nonverbal mimicry, and automatic behavior suggests that postural mimicry is the most likely response and will result in the greatest comfort and liking in the relationship. However, research on nonhuman animal behavior suggests that postural complementarity is the norm in many other species, including some of our closest evolutionary relatives. In addition, interpersonal circumplex theories also have suggested that postural complementarity is more likely and creates more warmth in the relationship than mimicry of dominant and submissive behaviors. Each of these approaches is described below.

### The Likelihood and Benefits of Mimicry

People's tendency toward, and preference for, similarity is at the cornerstone of social psychology. Classic studies showed that people change their behavior and conform to others (Asch, 1955, 1956; Sherif, 1936), and, in both romantic relationships and friendships, people are attracted to and like similar others more than dissimilar others (Byrne, 1971; Byrne & Griffitt, 1969; Clore & Byrne, 1974; Duck & Craig, 1978; Hendrick & Page, 1970). Further, they become more similar to their friends and romantic partners over time (Zajonc, Adelman, Murphy, & Niedenthal, 1987), and relationships with similar others are more satisfying (Antill, 1983; Eysenck & Wakefield, 1981).

One way in which people create similarity is to engage in motor mimicry. The production of a behavior in one person that has just been exhibited by an interaction partner has been demonstrated in a number of contexts and with a number of behaviors (Cappella, 1997; Hatfield, Cacioppo, & Rapson, 1993; Hess, Philippot, & Blairy, 1999). Mimicry is heightened when people perceive themselves as similar (Cappella & Palmer, 1990; Gump & Kulik, 1997), have aligned goals (Lanzetta & Englis, 1989), share attitudes (McHugo, Lanzetta, & Bush, 1991), like the target (Bernieri & Rosenthal, 1991; Noller, 1984), want the actor to have positive perceptions and like them (Bavelas, Black, Lemery, & Mullett, 1986), or have the desire to empathize with the actor (Hoffman, 1984) or with people in general (Chartrand & Bargh, 1999), but these attributes are not necessary (Chartrand & Bargh, 1999; Hatfield et al., 1993). In fact, people seem to mimic without intending to and without realizing that they have done so, a phenomenon that Chartrand and Bargh (1999) called "the chameleon effect."

Like other findings having to do with the benefits of similarity, mimicry seems to result in greater liking, rapport, and comfort with the interaction partner (Bates, 1975; Bernieri, 1988; Bernieri, Gilles, Davis, & Grahe, 1996; Charney, 1966; Chartrand & Bargh, 1999; Hess et al., 1999; LaFrance, 1979; LaFrance & Broadbent, 1976; Manusov, 1993; Trout & Rosenfeld, 1980; for an exception see LaFrance & Ickes, 1981). Indeed, these positive outcomes of mimicry may be the reason that people are so likely to engage in this behavior (Argyle, 1990). In short, motor mimicry is functional. It serves to create greater warmth and affiliation among interactional partners.

Chartrand and Bargh (1999) provided a methodologically sound test of the tendency for mimicry and its interpersonal consequences, and they suggested a new explanation for the mechanism underlying this phenomenon. They argued that mimicry is a form of automatic behavior. It occurs because the original behavior functions as a prime. They reason that because unconsciously primed constructs appear to create behaviors that reflect the concept (Bargh, Chen, & Burrows, 1996; Dijksterhuis & van Knippenberg, 1998), so too might unconsciously processed behavior of one person create similar behavior in another person. In other words, Person A's behavior primes that behavior in Person B, and thus produces that behavior in Person B. They further suggested that the automaticity of mimicry is particularly functional because it allows people to create interpersonal warmth with little effort.

Research on mimicry is clear, however, that even if it is functional, it does not always occur. Because mimicry is particularly effective at increasing affiliation, it is most likely in those contexts in which affiliation goals are primary (Bavelas et al., 1986; Bernieri & Rosenthal, 1991; Hoffman, 1984; Lanzetta & Englis, 1989; Noller, 1984). For example, Lanzetta and Englis (1989) found that when individuals are in competition, they do not mimic. Similarly, the display of dominance and submissive behavior might implicitly define the context as a competitive one, or at least one in which affiliation is not the most important goal. In addition, Giles and Powesland (1975) suggested that mimicry depends on the status of the actor and argued that people mimic high status people, a pattern they call "accommodation" (also see Gregory & Webster, 1996). Research on accommodation also suggests that mimicry might take a different form for dominance and submissive behaviors. Specifically, because dominance behaviors suggest high status (Ellyson & Dovidio, 1985), it might be that only those behaviors are mimicked, whereas submissive behaviors are not. Thus, although research on nonverbal mimicry suggests that mimicry is widespread, it also provides reason to think that it may not generalize to dominant and submissive nonverbal behavior.

### The Likelihood and Benefits of Complementarity

Another possible response to dominant and submissive behavior is complementarity. That is, people might not only avoid mimicking these behaviors, they may in fact engage in the opposite type of behavior. Research in animal behavior and in interpersonal circumplex theories suggests this possibility.

Some researchers have argued that human postural expansion and constriction is reminiscent of the dominance displays in other species. Just as is the case with humans, in at least some species of nonhuman primates such as chimpanzees, dominant group members regularly adopt postures that make them appear as large as possible (de Waal, 1982). Their hair stands on end and they hold their arms and legs extended out from their body. Important for our questions, de Waal (1982) noted that in the chimpanzee colony he studied, these dominance displays were typically responded to with submissive displays. Chimps observing a dominant display constricted themselves and made themselves appear as small as possible. They bowed low to the ground with their limbs pulled in. In other words, the normal pattern of behavior in that chimpanzee colony was a complementary one where dominance was met with submissiveness (also see Goodall, 1986). de Waal's description of the chimpanzees' relationships with each other also suggests that postural complementarity leads to more peaceful relations. On the

occasions where dominant displays were responded to with dominant displays, it usually marked the beginning of a long period of sometimes quite violent conflict. Observations of other animals suggest the same kind of pattern (Tinbergen, 1953; Wilson, 1975). However, even though these researchers who work in the context of evolutionary theory suggest that the same patterns characterize human relations, it is not clear that they must. First of all, human group members may be more conscious and strategic about dominant and submissive behavior, leading them to notice these behaviors and question their legitimacy to a greater degree than other animals. Second, some researchers have suggested that humans have evolved to be more egalitarian in their relationships (Ehrlich, 2000), perhaps making complementarity both less common and less comfortable.

Research in the area of interpersonal circumplex theories also provides some predictions about the dominance–submission dimension of human behavior in social interactions. Interpersonal circumplex theories organize interpersonal behavior along two dimensions (Carson, 1969; Kiesler, 1983; Leary, 1957; Wiggins, 1979, 1982): the affiliation dimension (anchored by *agreeableness* and *quarrelsomeness*) and the control dimension (anchored by *dominance* and *submission*).<sup>2</sup> Circumplex theorists predict that people's behaviors will be similar to interactional partners along the affiliation dimension and opposite along the control dimension, and that when this complementary response occurs, the partners will like each other more and will be more comfortable (Carson, 1969; Horowitz et al., 1991; Kiesler, 1983).

Research testing the predictions of interpersonal circumplex models has provided mixed results. Some studies are supportive (Dryer & Horowitz, 1997; Estroff & Nowicki, 1992; Horowitz et al., 1991; Strong et al., 1988) whereas others are not (Nowicki & Manheim, 1991; Orford, 1986). However, methodological problems abound in this literature (Orford, 1986; Tracey, 1994). For example, these studies often videotape participants, but when the videotapes are coded, the reliability of coders for the control dimension is frequently below acceptable levels. This lack of agreement among coders is probably due to the coding schemes used, which rarely focus on specific behaviors and instead ask for general impressions (Gifford & O'Connor, 1987; Tracey, 1994). Additionally, many studies examine complementarity in personalities rather than in specific behaviors. Similarly, confederates are often given general directions about how to act dominantly rather than instructed to engage in specific behaviors resulting in difficulties in knowing how dominance or submission was actually expressed or the timing of the confederates' and participants' behaviors. Further, the interactional partners in these studies sometimes have unequal status roles (such as supervisor and supervisee or therapist and client), which may moderate or interfere with the basic patterns by producing role-consistent expectations and behavior (Orford, 1986; Tracey & Sherry, 1993). Finally, investigators often have not considered baseline behavior rates (Tracey, 1994). Thus, some believe that complementarity hypotheses deserve more careful and precise testing (Estroff & Nowicki, 1992; Nowicki & Manheim, 1991; Tracey, 1994). In the studies presented in this article, we examine complementarity in equal status dyads by looking at a specific behavior (postural expansion vs. constriction), and we examine change over time, which controls for baseline behavior.

All three of the approaches we have discussed (motor mimicry, animal behavior, and circumplex theories) predict that people will

behave in the way that will ultimately create the most comfortable relationships. But, they differ in their predictions about what response will lead to the greatest liking and comfort. Mimicry approaches suggest that postural mimicry will have the most positive effects, whereas circumplex theories and the animal research suggest that postural complementarity will have the most positive effects. Therefore, whereas circumplex theories and animal research suggest that dominant behaviors will invite submissive behaviors, motor mimicry research suggests that dominant behavior will evoke the same dominant behavior in another person.

The behavioral responses to submissive and dominant behavior and the psychological outcomes of these responses are important to understand for several reasons. First, these patterns can help us understand the processes underlying the emergence and stability of hierarchies in human groups. Behavioral postural complementarity and comfort with postural complementarity could be two mechanisms that support the spontaneous and unintentional emergence of hierarchical relationships. Second, they allow for an examination of the degree of similarity or difference between humans and some of their animal relatives. Third, they provide an important test of interpersonal circumplex theories. Finally, the existence of dominance complementary behavior would have important implications for recent theorizing about automatic behavior. If postural complementarity occurs, it suggests that there are domains in which a primed construct leads to contrasting rather than assimilative behaviors (also see Dijksterhuis et al., 1998; Park, Yoon, Choi, Kim, & Wyer, 2001; Spears et al., 2001; Stapel & Koomen, 2000).

### The Current Research

Our studies examine postural expansion and constriction. These behaviors are ideal because they signal opposite ends of the control dimension and they are also at the opposite ends of a physical continuum (i.e. body span), allowing us to pit a postural complementarity hypothesis against a postural mimicry hypothesis in a precise manner. In the first experiment we tested whether people mimic or complement another's posture, and whether these responses are related to the participants' liking of their partner and their comfort with the interaction. In the second experiment, participants were posed to either mimic or complement a confederate and again we examined how these poses affected comfort in the interaction and liking for the confederate.

The studies presented in this article were designed to be comparable with those of Chartrand and Bargh's (1999). In their first study, participants engaged in a picture description task with a confederate. The confederate then engaged in a nonverbal behavior (a foot movement or a rub on the face). The participants were videotaped and these tapes were later coded for indications of whether the participant engaged in the same behavior as the confederate (i.e. whether they mimicked). The results showed that participants mimicked; they rubbed their face more when interacting with the face-rubbing confederate and they tapped their feet more when interacting with the foot-tapping confederate. In the second study, confederates either mimicked or did not mimic participants while they engaged in the same picture description task. Those who were mimicked liked the confederate more and

<sup>2</sup> Interpersonal circumplex theories suggest that these dimensions are equally applicable to goals and personalities as well as to behaviors.



thought the interaction was smoother than those who were not mimicked.

Our two studies followed roughly the same procedures. However, we examined nonverbal behaviors that communicate dominance or submission. The dominant behavior was postural expansion and the submissive behavior was postural constriction. In the first study, participants engaged in a picture description task with a confederate who was either posed in an expansive (dominant) posture or in a constricted (submissive) posture, and we examined whether the participants expanded or constricted in response. A mimicry approach predicts expansion in the participants exposed to an expanded confederate, whereas a complementary approach predicts expansion in response to the constricted confederate. In the second study both the confederate and the participant were posed in either dominant or submissive postures. We examined whether mimicry or complementarity in posture resulted in the greatest comfort in the interaction and the greatest liking of the confederate.

## Experiment 1

### Method

#### Participants

Ninety-eight people (59 male and 39 female), who were on average 22 years old, participated in this experiment. When asked to indicate their ethnicity, 47 described themselves as having European roots, 28 as Asian, 11 as Latino/Hispanic, 8 as African, 1 as Middle Eastern, 1 as Native American, and 2 did not provide any information about their ethnic heritage. Some of the participants ( $N = 50$ ) were paid \$15 for their participation. They were recruited from an electronic mailing list maintained by the Stanford Graduate School of Business that advertises behavioral studies to people who have indicated that they are interested in participating in them. Other participants ( $N = 48$ ) participated in exchange for course credit for an organizational behavior class. Participants from both sources and of both genders were assigned to all conditions and the proportions across conditions were roughly equal. Initial analyses showed that there were no main or interaction effects due to the different sources of participants, so this variable is not discussed further. All participants were run individually with a same-gender confederate.

The data from 3 participants were excluded because during debriefing they said they suspected that their partner was actually a confederate.<sup>3</sup> In addition, 1 participant refused to be videotaped, and equipment malfunction resulted in our losing the video data for another. Therefore, the analyses are based on the remaining 93 cases (56 males and 37 females).

#### Procedure

Upon arrival at the laboratory, the experimenter led the participant and confederate to the testing room. After the confederate and participant were seated, the experimenter provided a brief description of the study and then both filled out consent forms. The experimenter then provided more detailed directions about how to complete the picture description task. Specifically, the experimenter said that the point of the study was to investigate what features of unique information were important to share. Each participant would see a series of three pictures projected onto the wall behind their partner's head. They were not allowed to turn and look at the pictures displayed behind them and thus would only see the pictures displayed behind their partner. Their task was to provide informative descriptions of the six pictures. The experimenter indicated that the confederate would describe the first picture, which the participant should listen to, and that the participant would describe the second. The two would alternate describing and listening until all six pictures had been described.

The participants were told that after the description component of the task they would be given a stack of similar pictures from which they would have to identify those that had been described to them. In actuality, this picture identification task did not occur. When the picture task began the confederate adopted the required postural position.

Once they were done with the picture descriptions, the experimenter told the participant and confederate that they needed to be separated for the remaining portion of the session. The experimenter led the confederate out, ostensibly to another room. The experimenter returned and handed the participant a questionnaire that contained the questions about the interaction. Once the participant finished the questionnaire, the experimenter told the participant that the experiment was over. Following the methods described in Chartrand and Bargh (1999), the experimenter queried the participants in a "funneled sequence" starting with quite general questions and moving toward more specific questions. In this debriefing session, experimenters noted whether the participants suspected that their partner was actually a confederate, the participants' belief about the hypotheses, their awareness of the posture of the confederate, and their beliefs about how the confederate's posture affected them and the interaction (Chartrand & Bargh, 1999; Neumann & Strack, 2000). Finally, participants were thanked and paid or given course credit.

#### Materials

*The room.* The study was run in an approximately 17-ft  $\times$  9-ft room that was set up with two chairs side by side against one wall facing a couch against the opposite wall. The confederate always walked in the room first and sat in one of the chairs and the participant was always directed to sit in the couch, across from the confederate. The participants had ample room to move regardless of the confederates' posture. There was a video camera in the corner of the room recording the participant.

*Stimuli.* Six slides of Kandinsky paintings were used. Three of them ("Black Lines," "Between the Light," and "Composition in Red") were always shown to the confederate and three of them ("Composition VII," "No. 58," and "Composition No. 2") were always shown to the participant. All of the slides were modern, abstract paintings. These slides were projected using two Kodak Etagraphic slide projectors. One projector displayed the image on the wall behind the confederate and the other displayed the image on the wall behind the participant.

*Confederates.* There were six confederates; three males and three females. The confederates were undergraduate students and young graduate students. All of them were normally sized for their gender. All were directed to present themselves as a typical undergraduate would and to take care not to wear or do anything that would stand out as unusual or odd to the participants. Participants were always paired with a same-gender confederate. All confederates memorized scripts for each painting they described. There were three conditions in this study: expansion ( $N = 36$ ), constriction ( $N = 40$ ), and neutral ( $N = 17$ ). All confederates were in all three conditions. In the expansion condition, the confederates draped their left arm over the back of the empty chair that was on their left side and they crossed their right leg such that the right ankle rested on the left thigh and the right knee protruded out to the right beyond the edge of the chair they sat in. In the constricted position, the confederates sat with their legs together and their hands in their lap and they slouched slightly. In the neutral condition, the confederates sat straight up with their legs slightly parted and their arms resting on the armrests of their chair. The confederates adopted the required position when the picture description task began and held it throughout the task. The confederates were obviously aware of the conditions, but they were not aware of the hypotheses.

*Dependent variables.* The most important dependent variable was the posture of the participants, which was coded from the videotapes of the

<sup>3</sup> Two of these were in the confederate constricted condition and one was in the confederate expanded condition. All three were recruited from the electronic mailing list.

sessions. However, after the picture description task, the participants also filled out a questionnaire on which they indicated the degree to which they felt comfortable with the interaction, the degree to which they liked their partner (the confederate), and the degree to which they considered their partner to be dominant. Four items were averaged to create a composite measure of comfort. These items were ratings of (a) how comfortable the participant was describing the pictures, (b) how comfortable the participant found the interaction, (c) the degree to which the participant felt relaxed during the task, and (d) the reverse of the degree to which the participant felt anxious during the task. All of these ratings were made on 7-point scales, anchored by *not at all* and *very*. The liking composite consisted of ratings of how much the participant liked the partner and how popular the participant thought the partner was. Again, these ratings were made on 7-point scales anchored with *not at all* and *very*. The perceived dominance measure was the average of two trait ratings (self-confident and unself-conscious) made by the participants about their partner on 7-point scales anchored with *not at all* and *very*. Self-confident and unself-conscious are indicators of dominance in Wiggins's (1979) taxonomy interpersonal traits. This measure was used as a manipulation check to determine whether the confederates' postures communicated the desired dominance level.

### Posture Coding

The videotapes were coded to measure the postural expansion versus constriction of the participants. Coders measured the amount of space that the participant filled by holding a ruler up on the screen and counting the inches from the farthest out points of the body. They took the first posture measure once the confederate started the picture description task and stopped the tape every minute and measured the posture at each of these stopping points. The length of the videos varied, depending on how long the participant spoke, thus the number of measures for a participant ranged from 7 to 16. One coder coded all participants and then another coder coded 48 of the participants to check whether the measure was reliable. The two coders' ratings were highly correlated ( $r = .88$ ), suggesting that this kind of coding is quite objective. Therefore, the original coder's measures were used in the analyses.

We were interested in how the participants' posture changed over time, and specifically whether they responded to the confederates' positions by becoming larger over time (expanding) or becoming smaller (constricting) over time. Thus, for each participant, we examined the relationship between the body span measure and the time interval at which the measure was taken. Specifically, for each participant, we regressed the body span measure on the time measure. These analyses provided two data points for each participant: a beta score and an intercept. The beta indicates whether the participant tended to expand over time (a positive beta from the regression of body span on time) or whether their posture constricts over time (a negative beta). The betas ranged from  $-.94$  to  $.89$ . Using the beta as an indicator of expansion and constriction is ideal because it takes into account and controls for the participants' natural body size and positioning (Tracey, 1994). The intercept is the body span at the first reading (i.e. time = 0). This measure is an estimate of the participants' posture at the beginning of the session and provides the context for the betas. Essentially, it allows us to determine whether people in the different conditions began with a similar or different body span, and thus allows us to better interpret the meaning of the betas.

## Results

### Manipulation Checks

The perceived dominance measure was subjected to a one-way (confederate position: expanded vs. constricted vs. neutral) analysis of variance (ANOVA) in which the three-level confederate position factor was used as a predictor. This analysis showed a main effect for confederate position,  $F(2, 90) = 4.42, p < .05$ ,

reflecting the predicted pattern that expanded confederates were perceived as most dominant ( $M = 4.85, SD = 0.81$ ), then neutral ( $M = 4.35, SD = 1.53$ ), and then constricted confederates ( $M = 4.16, SD = 0.92$ ); and a linear contrast of these levels was also significant,  $F(2, 90) = 8.53, p < .01$ , providing a replication of the finding that the more expanded an individual is the more dominant that individual appears.<sup>4</sup>

### Participants' Posture

*Initial posture (the intercepts).* First, we analyzed the intercepts to determine whether there was consistency across conditions in the participants' initial body span. These intercepts were analyzed by a 3 (confederate posture: expanded vs. constricted vs. neutral)  $\times$  2 (gender: male vs. female) ANOVA. There was a main effect of gender,  $F(1, 87) = 7.46, p < .01$ , because men tended to have a larger initial body span ( $M = 11.92, SD = 2.80$ ) than women ( $M = 10.58, SD = 2.83$ ). There was no main effect for confederate posture nor an interaction between confederate posture and gender (both  $F$ s  $< 0.5$ ). These null results indicate that there were no differences in the initial postures of participants across conditions (confederate constricted:  $M = 11.44$ ; confederate expanded:  $M = 11.42$ ; confederate neutral:  $M = 11.11$ ).

*Posture over time (the betas).* The betas derived from the regressions of body span on time indicate the degree to which people expanded or constricted from their original starting point. We performed a Fisher's  $Z$  transformation on these betas following the recommendations of Judd and McClelland (1989). We then analyzed this transformed variable with an ANOVA in which the confederates' posture (constricted, expanded, or neutral) and gender were the independent variables. In this analysis, the only significant effect was a main effect of confederate's position,  $F(2, 87) = 3.64, p < .05$ . The pattern supported the complementarity hypothesis. The mean in the expanded condition was negative, indicating constriction ( $M = -0.26, SD = 0.64$ ); the mean in the constricted condition was positive, indicating expansion ( $M = 0.20, SD = 0.68$ ); and the mean correlation in the neutral condition was close to zero ( $M = 0.10, SD = 0.72$ ). A linear contrast provided evidence that the body span of the participants was linearly negatively related to the body span of the confederates,  $F(2, 87) = 7.23, p < .01$ .

### The Interaction of Participants' and Confederates' Postural Position on Impressions

To examine whether participants experienced the greatest liking of the confederate and comfort with the interaction when they mimicked or when they complemented, we transformed the beta measure into a three-level variable (constricting vs. expanding vs. neither constricting nor expanding) by creating three equal sized groups. The range of betas for the constricting group was  $-.94$  to  $-.33$ , and the range for the expanding group was  $.35$  to  $.89$ . The middle third were considered to be neither constricting nor expanding. Near-zero betas of time and body span can indicate either that the participant's body span was constant over time, or that

<sup>4</sup> Contrast weights here and the subsequent analysis on the beta weights were  $-1$  for constriction,  $0$  for neutral, and  $1$  for expansion.

Table 1  
*Mean Impression Ratings (and Standard Deviations) as a Function of Confederates' and Participants' Postures in Experiment 1*

Relationship impressions and participant's posture	Confederate's posture		
	Expanded	Neutral	Constricted
Liking			
Participant expanding	4.17 (1.20)	4.50 (1.48)	4.44 (1.08)
Cell size	9	6	16
Neither expanding nor constricting	4.62 (.74)	3.70 (2.20)	4.50 (0.85)
Cell size	12	5	14
Participant constricting	5.17 (1.30)	4.50 (0.71)	3.65 (1.08)
Cell size	15	6	10
Comfort			
Participant expanding	4.27 (1.50)	4.99 (1.71)	5.07 (0.91)
Cell size	9	6	16
Neither expanding nor constricting	4.70 (0.97)	4.73 (2.71)	5.45 (0.96)
Cell size	12	5	14
Participant constricting	5.00 (1.24)	4.35 (0.78)	3.98 (0.94)
Cell size	15	6	10

their movement was random.<sup>5</sup> When this variable is crossed with the confederates' position variable, nine cells are produced, two of which represent mimicry (both participants and confederates expanded and both participants and confederates constricted), two cells represent complementarity (participants expanded while confederate constricted and participants constricted while confederate expanded), and five cells for which there were no predictions either because the confederate was posed in a neutral fashion or because the participant was neither clearly expanding nor clearly constricting. The means, standard deviations, and cell sizes for the liking and comfort variables are displayed in Table 1. Because our hypotheses were about the differences between complementary cells and mimicry cells, and because the cell sizes for some of the neutral cells were so small, we collapsed these nine cells into the three most relevant conditions (complementarity, mimicry, and neither complementary nor mimicry) and performed two one-way ANOVAs using this three-level variable as a predictor for the composite liking and comfort variables.<sup>6</sup>

The ANOVA on the liking variable was significant,  $F(2, 90) = 3.54, p < .05$ ,<sup>7</sup> and the complementarity hypothesis was supported over the mimicry hypothesis. Mimicry was associated with less liking ( $M = 3.89, SD = 1.14$ ) than the neither mimicry nor complementary group ( $M = 4.44, SD = 1.11$ ),  $t(90) = 1.72, p < .10$ , or the complementary group ( $M = 4.79, SD = 1.23$ ),  $t(90) = 2.66, p < .01$ . The difference between mimicry and complementarity was significant,  $F(2, 90) = 7.07, p < .01$ .

The ANOVA on the comfort variable was also significant,  $F(2, 90) = 3.80, p < .05$ , and again provided more support for the complementarity hypothesis than for the mimicry hypothesis because mimicry ( $M = 4.11, SD = 1.21$ ) was associated with less comfort than neither mimicry nor complementarity ( $M = 4.94, SD = 1.35$ ),  $t(90) = 2.43, p < .05$ , or complementarity ( $M = 5.04, SD = 1.07$ ),  $t(90) = 2.57, p < .05$ . Once again, the difference between mimicry and complementarity was significant,  $F(2, 90) = 5.63, p < .05$ .

### Participants' Awareness of Their Responses

We examined the role of conscious cognition about complementarity in two ways; first by looking at the relationship between the

manipulation check and the behavioral response, and second by considering the participants' responses to the debriefing. A correlational analysis on the perceptions of dominance and the degree of expanding showed no relationship between these two variables ( $r < .1$ ). Further, during the funnel debriefing, participants were asked if there was anything that particularly stood out to them about the way in which their partner was seated during the interaction. Only 5 people responded with answers that described something unique about the condition they were in. In addition, none of the participants suggested either the complementarity or mimicry hypothesis when questioned.

### Discussion

Overall, this study provides more support for the postural complementarity hypothesis than the postural mimicry hypothesis. Indeed, we found no evidence for generalized mimicry or a more specified mimicry of only certain behavior (i.e. accommodation). Yet, that does not mean that people were insensitive to others' behavior. When the confederate displayed a dominant or submissive posture, participants were likely to respond with the opposite

<sup>5</sup> Although it can be problematic to create categorical versions of continuous variables, we thought that the test of the categorical variable better represented our conceptual framework. We were not concerned with the relative rate of expansion or constriction, but rather whether people complemented or mimicked. However, the results for regression analyses in which this variable was kept continuous are reported in Footnote 7.

<sup>6</sup> Initial analyses showed that the only effect involving gender was a main effect on the liking variable, due to male participants liking the confederates they interacted with more than females. However, because gender did not interact with the postural variable, we present the simpler analyses here.

<sup>7</sup> We also examined the interaction term for the full  $3 \times 3$  ANOVA. The interaction was marginally significant for both variables—liking:  $F(4, 84) = 2.44, p = .053$ ; comfort:  $F(4, 84) = 2.27, p = .07$ . We examined this interaction with regression, keeping the beta variable in its continuous form and examining the interaction between it and the confederates' position. For both liking and comfort, the interaction was significant—liking:  $\beta = -.26, t(89) = 2.60, p < .05$ ; comfort:  $\beta = -.22, t(89) = 2.10, p < .05$ .

kind of display. Dominance appears to invite submissiveness and submissiveness appears to invite dominance. Dominant and submissive behaviors do not just affect perceptions of the actor, as has been shown in previous research, but also the behavior of people around that actor. These behaviors seem to function as influence techniques that communicate the appropriate positions of each party. But, people seem to be unaware of these effects. Nonetheless, we observed that quickly and automatically people become situated in such a way as to suggest a hierarchically differentiated relationship.

This study also provides some information about the consequences of complementary versus mimicked responses. The results suggest that when people respond to dominance with submissiveness and submissiveness with dominance there is greater comfort and liking. However, when dominance is met with dominance or submissiveness with submissiveness, there is less liking between the interaction partners and the interaction is less comfortable. These patterns suggest that in the short term, going along with a hierarchical configuration can be more comfortable than fighting it. Indeed, the discomfort that can be a consequence of two people having the same posture may be one reason that people are likely to complement rather than mimic dominant and submissive postural stances.

This study does not establish the causal or sequential nature of the comfort and liking effects. In fact, the design of this study cannot distinguish between the explanation that complementary behavior leads to liking and comfort and the explanation that people complemented when they felt comfortable and liked the confederate and mimicked when they didn't. Thus, in the second study, we used a similar paradigm, but randomly assigned people to either complementary or mimicking conditions. This design allowed us to test whether dominance complementary behavior causes comfort and liking.

## Experiment 2

### *Method*

#### *Participants*

Eighty participants (34 men and 46 women), who were on average 20 years old,<sup>8</sup> were recruited from two sources. Thirty-seven were recruited from the Stanford Graduate School of Business electronic mailing list described in Experiment 1 and were paid \$10 for their participation. Another 43 were recruited from an undergraduate course in organizational behavior, and received course credit for their participation. All of the analyses were originally conducted using participant source as a predictor variable, but because no significant main effects or interaction effects were found, we collapsed this variable and it is not discussed further. The data from 2 participants were excluded because of confederate and experimenter error and from 4 others who suspected that their partner was a confederate.<sup>9</sup>

#### *Materials and Procedure*

*The picture description task.* The picture description task was essentially the same as in Experiment 1. Participants once again sat across from a confederate, who assumed either the constricted or expanded posture. Participants and confederates took turns describing the same six pictures used in the previous experiment. After the picture description task, the participant and the confederate were separated, the participants filled out a short questionnaire, and then the participant was debriefed in the same way as in Experiment 1.

*The cover story.* The cover story was altered from the previous study. We told the participants that not only were we interested in what features

of unique information were shared, but also how physiological arousal is involved in the sharing of unique information. The experimenter explained that we only had sufficient equipment to measure one person's physiological state. The experimenter showed a small skin conductor measurement device (Advanced Technology AT<sub>64</sub> Portable SCR, Autogenic Systems, Wood Dale, IL) and said that this machine would be used to monitor one person's physiological responses. The experimenter paused and looked back and forth between the participant and confederate, as if choosing between them, and finally asked the participant whether he or she would be willing to have his or her physiological state monitored. All participants agreed. The experimenter then placed small sensors, attached by Velcro, to the fingers of the participants.

*Independent variables.* The change in the cover story provided justification for the additional randomly assigned variable that was part of this study: the participants' postural pose, which had two levels. The participants were either posed in an expanded or constricted fashion. In the expanded condition, the participants were told that in order for the physiological monitoring to be accurate, the participants needed to keep their hands at heart level. Thus, the participants were directed to place their arms up on the backs of the empty chairs next to them. In the constricted condition, the participants were told that in order for the physiological monitoring to be accurate, they needed to keep their hands below heart level and thus we requested that they hold their legs together and place their hands on their thighs. Participants in both of these conditions were asked to hold these positions and keep as still as possible through the duration of the information exchange.

Participants were paired with one of six same-gender confederates. The confederates were posed in either an expanded or constricted fashion. As in Experiment 1, the confederates posed once the picture description task began and acted as though it was spontaneous behavior. Thus, the design of the study was a 2 (participant position: expanded vs. constricted)  $\times$  2 (confederate position: expanded vs. constricted) factorial, resulting in two mimicry conditions (both expanded and both constricted) and two complementarity conditions (participant expanded and confederate constricted, and participant constricted and confederate expanded).

*Dependent variables.* The same questionnaire items that were used in Experiment 1 were used in this study to measure liking for the confederate and comfort with the interaction.

## *Results*

### *Liking the Confederate*

A 2 (confederate position: expanded or constricted)  $\times$  2 (participant position: expanded or constricted) ANOVA was used to analyze the participants' ratings of their liking of the confederate. There were no significant main effects, but the interaction between confederate posture position and participant posture position was significant,  $F(1, 70) = 4.89, p < .05$ . The means involved in this interaction can be found in Table 2. The predicted mimicry versus complementarity contrast was significant,  $t(70) = 2.21, p < .05$ , and indicated that participants liked the confederates more in

<sup>8</sup> We did not query the participants about their ethnicity in this study, but because the recruitment methods were so similar as the previous study, we expect that the ethnic composition would be similar.

<sup>9</sup> Two of the suspicious participants were recruited from the class and two were recruited from the electronic mailing list. One was in the mimic constricted condition, and the other 3 were in the participant expanded, confederate constricted condition.



Table 2  
*Mean Impression Ratings (and Standard Deviations) as a Function of Confederates' and Participants' Postures in Experiment 2*

Relationship impressions and participant's posture	Confederate's posture	
	Expanded	Constricted
Liking		
Participant expanded	4.06 (1.08)	4.37 (0.72)
Cell size	20	16
Participant constricted	4.64 (0.97)	4.10 (0.70)
Cell size	19	19
Comfort		
Participant expanded	4.46 (0.98)	5.01 (0.66)
Cell size	20	16
Participant constricted	5.08 (0.95)	4.63 (1.09)
Cell size	19	19

complementary conditions ( $M = 5.01$ ,  $SD = 0.80$ ) than in mimicry conditions ( $M = 4.56$ ,  $SD = 0.95$ ).<sup>10</sup>

#### *Comfort with the Interaction*

A 2 (confederate position: expanded vs. constricted)  $\times$  2 (participant position: expanded vs. constricted) ANOVA was also used to analyze the participants' ratings of their comfort with the interaction. There were no main effects, but the predicted interaction between participant and confederate posture position was significant,  $F(1, 70) = 4.31$ ,  $p < .05$ . The means involved in this interaction are also presented in Table 2. Again, the predicted mimicry versus complementarity planned contrast was significant,  $t(70) = 2.08$ ,  $p < .05$ , and indicated that participants were more comfortable in complementary conditions ( $M = 5.04$ ,  $SD = 0.79$ ) than in mimicry conditions ( $M = 4.59$ ,  $SD = 1.03$ ).<sup>11</sup>

#### *Participants' Awareness of Effects*

In the funnel debriefing, when asked about what they noticed about how their partner was sitting, only 5 people in the mimicry conditions noticed that their interaction partner was either "mirroring" their posture or "sitting in the same way" as they were. These people were approximately evenly distributed across the expanded mimicry condition ( $N = 3$ ) and the constricted mimicry condition ( $N = 2$ ). However, none of these participants believed this similarity affected their feelings about the interaction. Three people in the complementarity conditions noticed the way their partner was sitting. None of these participants thought their feelings about the interaction were affected by their partner's posture. None of the participants guessed either the mimicry or complementarity hypothesis. So, once again, most participants were simply unaware of the manipulation, and even those who were aware, did not notice the effects of it.

### General Discussion

In the two experiments in this article, participants were exposed to a confederate who displayed dominant or submissive behavior. We examined how these behaviors affected the participants' behavior and their impressions of the interaction. In the first study, we observed that most people respond to another's power moves

with complementary responses, and in both studies, we observed that when complementarity occurs, people feel more comfortable. People did not seem aware of their tendency to respond to dominant behaviors with submissive behaviors and submissive behaviors with dominant behaviors, nor did they seem aware of the ways in which interpersonal configurations of dominant and submissive behaviors affected their feelings about their partner and the interaction.

These patterns might help us understand the formation and maintenance of status hierarchies. They show just how easily people can slip into status-differentiated behavior and the feelings that support and reinforce status differentiation. These findings also have implications for recent theorizing on automatic behavior and for interpersonal circumplex theories.

#### *Implications*

These studies provide insight into the negotiation of status positions in relationships in which no prior hierarchy exists. People face such situations continuously through their lives. We meet new people, or work on a new project with an old acquaintance; in these situations people quickly determine who is dominant and who is submissive. These decisions impact future access to resources, power to influence outcomes, and patterns of who will evaluate whom. In initially egalitarian groups and relationships, the first dominant or submissive display provided by an individual may be the result of random movement or may be tactical strategy, but whatever its cause, its result can be a hierarchical relationship if an observer responds in a complementary fashion. The comfort and liking that individuals experience when in complementary situations would further support the emergence of the hierarchical relationship. If people feel better when there are signals that one person is dominant and one person is submissive than when people are displaying similar signals, then people are likely to promote that differentiation. Thus, nonverbal complementarity and the comfort and liking associated with it may encourage hierarchical relationships and help maintain them. Automatic nonverbal complementarity may be one reason that hierarchies are so common and widespread.

Chartrand and Bargh (1999) argued that the combination of the participants' lack of awareness of the confederates' effects on their own nonverbal behavior and the functional interpersonal consequences of this behavior suggest that these behavioral patterns are automatic. Our studies show the same characteristics. The participants were largely unaware of the nonverbal patterns that occurred. Nonetheless, these behaviors affected their comfort and liking, even though they were unaware of this functional aspect of their behavior. Thus, according to Chartrand and Bargh's logic, complementary behavior could also be considered automatic (also see Darwin, 1872/1998, about the habitual nature of many expressive displays; Leary, 1957, who likened complementary behavior to a reflex; and Wright, 1994, who argued that complementarity in animals probably occurs without consciousness). This means that

<sup>10</sup> This analysis was also run with gender as a predictor. This analysis showed a main effect for gender with women liking the confederate they interacted with more than men. There were no interactions involving gender.

<sup>11</sup> A similar analysis including gender showed no main or interaction effects due to gender.

mimicry may not be the only form of automatic behavior response to others' nonverbal behavior.

Further evidence about whether postural complementarity is automatic is needed, but if indeed it is, then a number of other questions need attention. First, research should investigate whether the automaticity of postural complementarity is an evolved characteristic or, like so many other automatic behaviors, learned through repetition and experience. If it is learned rather than evolved, complementarity should be heightened in people with more experience in hierarchical group settings than in people with less experience in hierarchies. Second, future research should be directed toward understanding the mechanisms involved in this effect. Several possibilities have been suggested to explain automatic unconscious behavior (see Wheeler & Petty, 2001), and of these, two seem the most likely. In his work on the automatic behavior, Bargh has argued that behavior can be created automatically through exposure to semantically similar stimuli (Bargh et al., 1996; Chen & Bargh, 1999; also see Dijksterhuis & van Knippenberg, 1998). However, here we found a contrasting response. This finding allows for the possibility that, in this case, there are stronger associates between opposing constructs (i.e. dominance–submission) than between similar constructs (i.e. dominance–big, submissive–little). Another possibility is that the confederates provided a social comparison target from which the participants contrasted themselves (Dijksterhuis et al., 1998). The confederates' behaviors may have created an extreme exemplar of dominance or submission, from which the participants contrasted in their own self-views. Their behavior may have then reflected those contrasted self-construals (also see Wheeler & Petty, 2001).

Regardless of the exact mechanism involved in producing the behavior, the tendency of people to respond to dominant behavior with submissive behavior and submissive behavior with dominant behavior is consistent with the propositions made by interpersonal circumplex theorists (Carson, 1969; Kiesler, 1983; Leary, 1957). The effects that complementarity had on comfort and liking also support the predictions of interpersonal circumplex theories (Carson, 1969). Thus, these results suggest that interpersonal circumplex theories can help predict and understand interpersonal patterns of nonverbal behavior. Indeed interpersonal circumplex theories could likely be used to understand a host of nonverbal interchanges (Gifford, 1991; Gifford & O'Connor, 1987).

Interpersonal circumplex theorists have been primarily interested in whether personalities can be described along the control and affiliation dimension, whether specific behaviors are affected by proximal relational surroundings, and how the interaction of people's personalities affect relationship satisfaction and quality. Yet, postural complementarity in behavior also has profound implications for topics such as likely group structures. In these studies we showed that people are likely to respond to dominance with submission and submission with dominance and that people are most comfortable when they are in an interaction in which nonverbal behaviors are opposite along the control dimension. Other research has shown that when people display dominant nonverbal behavior, not only do others think they are stronger and more competent (Keating, 1985), but also that they deserve to hold higher status positions (Tiedens, 2001). Thus, these complementing nonverbal behaviors might start a cycle in which people accrue status simply by displaying these behaviors.

### *Possible Boundary Conditions*

Of course, there are probably a number of important boundary conditions to complementary behavior and the interpersonal consequences associated with it. For example, animals are unlikely to display dominance signals unless they are dominant in the group; and, when animals of a lower rank or new to the group or territory display dominance, others express dominance in return (de Waal, 1982). This suggests that complementarity will be strongest when it coincides with formal roles or positions, and may not occur when it contradicts those positions. The kinds of spontaneous reactions we found may be limited to contexts in which there is no prior hierarchy. However, because many relationships, groups, and organizations begin without a formal hierarchy in place, these nonverbal patterns have the potential for powerful effects in many contexts.

Complementary behavior may also be more likely in some kinds of situations than in others. For example, if people are more focused on creating an affiliative and friendly relationship, they may be less likely to engage in hierarchically differentiated behavior than when they are in a task setting. Alternatively, when there are greater rewards associated with being in a dominant position, people may be less willing to adopt a submissive stance.

In addition, complementary behavior in human egalitarian relationships may depend on it remaining unconscious. If people consciously thought about their interaction partner engaging in "a power move," their response might be quite different. They would likely consider whether there is evidence that their partner has the right to behave dominantly and deserves a submissive response. Indeed, consciousness of the expression of dominant and submissive nonverbal behaviors and their effects may empower individuals to purposefully decide on the structure of their relationships, rather than simply falling into a complementary pattern of behavior.

These two studies showed that people's level of comfort with the interaction and the degree to which they liked their partner depended on the interaction of their display and their partner's display. These results suggest that there are some benefits associated with complementary nonverbal behavior. Yet, it is important to be clear about the nature of these benefits. It is likely that in the short term it is easiest and most comfortable not to rock the boat, but that should not be confused with long-term psychological consequences of hierarchically differentiated relationships. In fact, quite a lot of research has shown the severely damaging effects chronic low status can have on mental and physical health (Gilbert, 1992; Stansfield & Marmot, 1992). It is also likely that people who find themselves in domineering positions without the skills or attributes necessary for that position are unhappy and uncomfortable in the long term. Complementary behavior then simply avoids conflict in the short term. Noncomplementary behavior, or dominance-mimicking behavior, may increase conflict immediately, but such conflict may have benefits for the parties in the long term.

Many researchers have noted that hierarchical group structures are omnipresent in both human and nonhuman primate groups (de Waal, 1982; Eibl-Eibesfeldt, 1989; Goodall, 1971; Lonner, 1980; Murdock, 1945; Wright, 1994), yet, particularly for human groups, there is little information about how group members end up in different status positions and how the negotiation of the positions is achieved. These studies suggest that automatic and unconscious

nonverbal postural complementarity may be one crucial step in the little understood process of hierarchy emergence and stability.

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