WORKING TOGETHER AS ONE: ACHIEVING SOCIAL COORDINATION THROUGH POSITIVE EMOTIONS AND SELF-REGULATORY RESOURCES

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ABSTRACT

TANYA VACHARKULKSEMSUK: Working Together as One: Achieving Social Coordination through Positive Emotions and Self-Regulatory Resources
(Under the direction of Barbara L. Fredrickson)

Social coordination (SC) is a phenomenon that plays out in a host of everyday instances (e.g., flight crew, sports teams), characterized by multiple actors working toward one goal. This study examines the role of emotions and self-regulatory resources (SRR) in facilitating SC among dyads. Ninety-seven pairs of same-sex strangers were recruited for the study and randomly assigned to a SRR manipulation and a partner emotional connectivity task. Following the experimental manipulations, pairs played a laboratory-based SC card game (Cohen & Bacdayan, 1994), and then returned one week later to play a second round of the game. Results do not confirm the prediction that positive emotions facilitate SC, and mixed results appear for the interaction of emotions and SRR in facilitating SC. Notably, time emerges as a significant predictor of all SC measures, although no hypotheses were formulated for this effect. Strengths and limitations, and avenues for future research are discussed.

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CHAPTER 1

INTRODUCTION

Words are inadequate to describe the emotion aroused by the prolonged movement in unison that [military] drilling involved. A sense of pervasive well-being in what I recall; more specifically, a strange sense of personal enlargement; a sort of swelling out, becoming bigger than life, thanks to participation in collective ritual. – McNeill, 1995, p. 2

The idea of individualism is rooted in America's political history, and together with recent advances in technology, individuality has permeated our everyday lives. YouTube, reality television shows, personalized M&M candies, customized postage stamps, and self-made iPod playlists are just a few examples of how the "me" era has mushroomed in recent years. In fact, "You" were named *Time* magazine's "Person of the Year" in 2006. However, this study seeks to investigate what our attention has strayed from: the significance of "we" rather than "me". From dividing chores up within the household to keep things tidy, to collaborating with colleagues on a manuscript, to planning and executing a surprise party for friends, we humans are dependent upon others to make a collective effort possible and successful. To give a more concrete example, consider vast accomplishments, such as the construction of Stonehenge or the Pyramids, or the landmark discovery of DNA—behind each of these lies a collective effort of multiple people. That is, none of them were products of one person, but rather, teams of people. Such cooperative behavior not only makes an effort easier to carry out, but also allows for those involved to economize their energetic and temporal resources. Moreover, when one becomes a part of the whole—when "me" becomes "we"—emotions are evoked and become involved with the trajectory of collaboration with

others. The goal of the present study is to begin unpacking what McNeill describes in the above quote as a "strange sense" that comes about in a team context, by examining how the process of social coordination unfolds.

CHAPTER 2

WHAT IS SOCIAL COORDINATION?

Social coordination is defined here as the "interlocking, reciprocally-triggered sequences of skilled actions" of individuals working toward a common goal (Cohen & Bacdayan, 1994). More specifically, it is the combination of multiple actors' independent skills building upon one another to achieve a goal more efficiently than the sheer sum of individual effort. What results is a seemingly choreographed dance of fluid, efficient movements between people—product of the group, rather than the individual. This phenomenon plays out in a host of everyday instances, such as a flight crew preparing for landing or a basketball team executing a play. Each person's action is interdependent on one that of another, thereby developing a sequence of anticipated behaviors en route toward a common goal.

In this study, I distinguish between two different types of social coordination that differ in their content of action patterns. *Efficient social coordination* is achieved when the common goal is attained *quickly* among the involved actors. *Elegant social coordination*, however, is characterized by the development and use of strategies that require fewer action sequences, and thus less time to achieve the goal. Whereas efficient social coordination is conservative in terms of time, elegant social coordination is conservative in terms of both time and resources. To illustrate, a basketball team can make seven passes among all five of its players in nine seconds before getting a high-percentage shot off. On the other hand, a

basketball team executing an instance of elegant social coordination would make three passes among its players before getting a high-percentage shot off, and shedding just five seconds off the shot clock. So, although both plays ultimately accomplish the same goal (getting a good shot off), the action sequences by which each was attained utilize differing levels of resources (players' energy and time on the clock), which may serve well for the long run.

CHAPTER 3

BRIEF OVERVIEW OF PAST RESEARCH

In the past, many studies of routines and organization theory have come from field observations. Cohen and Bacdayan (1994) pioneered the experimental approach to reproduce characteristic patterns of organizational behavior. In their experiment, participant dyads representing organizational units played a simple cooperative card game that required each participant's (randomly assigned) complementary skill to successfully complete a hand. Cohen and Bacdayan's laboratory study found that the dyads' patterns of play replicated features found in organizations, including reliability, speed, the use of repeated action sequences, and occasional suboptimality. As observed by the researchers during cases of elegant social coordination, "one is reminded of the way a skilled touch typist rapidly generates a familiar word with overlapping keystrokes—except that here the two hands are on different bodies" (p. 563). Moreover, the study found that participants used procedural (as opposed to declarative) memory, which requires both motor and cognitive skill, to retain and recall their strategies. Similar to one's knowledge for how to ride a bike, this suggests that over time, social coordination is achieved with less difficulty and more automaticity as the individual quickly draws on past experience.

So how do we get there? What are the optimal conditions by which individuals can achieve efficient, and even elegant, social coordination with other people? What are the underlying processes, at both the individual and dyadic levels? Past literature has suggested

various fundamental elements that contribute to social coordination. In a field study of joint replacement surgery completion times, Reagans, Argote, and Brooks (2005) identified (a) cumulative individual experience, (b) cumulative organizational experience, and (c) cumulative experience of the individuals working together, as distinct contributors to effective teamwork and decreased surgery completion times. Others cite leadership—a group leader's actions, behaviors, and work style—as the key to effective teamwork (e.g., Cooperrider & Sekerka, 2003; Luthans & Avolio, 2003). There are also arguments that, at a cognitive level, perspective-taking fosters social bonds and facilitates social coordination (Galinsky, Ku, & Wang, 2005; Davis, Conklin, Smith & Luce, 1996). And finally, a nonlinear dynamical model developed by Vallacher, Nowak, and Zochowski (2005) showed that similar internal states (e.g., moods, traits) in a close relationship facilitates coordinated behavior. Below I detail how positive emotions and self-regulatory resources can guide the dynamic process of achieving efficient and elegant social coordination.

CHAPTER 4

POSITIVE EMOTIONS AS A ROUTE TOWARD SOCIAL COORDINATION

I posit that by way of broadened thinking and increased interpersonal connectedness, the experience of positive emotions within a social interaction can ultimately build efficient and elegant social coordination within a dyad. My thinking is guided by Fredrickson's broaden-and-build theory of positive emotions (1998, 2001), which argues that positive emotions (e.g., joy, interest, contentment) function in the short term to broaden one's thought-action repertoire, and consequently over the long term, to build one's cognitive, social, psychological and/or physical resources.

At the individual level, a host of laboratory studies have shown that people induced with positive emotions shift their attention to include a wider scope (Fredrickson & Branigan, 2005; Wadlinger & Isaacowitz, 2006), draw from a larger stock of desired actions (Cunningham, 1998; Fredrickson & Branigan, 2005), and are more open to new experiences (Isen, 1970; Kahn & Isen, 1993), compared to people in a neutral or negative emotional state. At the interpersonal level, positive emotions have been associated with increased "oneness" and complex understanding among participants with a new college roommate (Waugh & Fredrickson, 2006), increased trust in acquaintances (Dunn & Schweitzer, 2005), and the ability to recognize faces of a race different from their own (Johnson & Fredrickson, 2005). And finally, at the organizational level, Losada and Heaphy (2004) used nonlinear dynamical modeling to show that a high degree of connectivity and positive-to-negative ratios within an

organization was correlated with higher team performance. Not only did the mathematical models show high-performance teams utilizing a broader range of behavioral repertoires in the short term, but they were also building a durable psychological and social resource by making strong connections with fellow team members. In contrast, lower performance teams appeared to have low levels of connectivity and lower positive-to-negative ratios, which made them more prone to getting "stuck" in situations because of a limited behavioral repertoire and decreased likelihood of building strong team member connections.

Research on dyadic social interactions also support the broaden-and-build theory, such that positive emotional processes occurring within a dyad can have effects on the dyad itself. Similar to Losada and Heaphy's findings described above, Gottman's (1994) research on married couples has shown that the ratio of positive-to-negative verbal and nonverbal behaviors was the best predictor of marital stability. Aron, et al. (2000) also studied couples' interactions and found that, when experienced with a partner, novel and energizing activities can enhance relationship quality; more recent research has found that relationship quality was, in fact, enhanced due to the positive affect generated by the novel activity (Strong & Aron, 2006). Together, these studies highlight how emotions occurring within a dyad can have implications at and beyond the individual level.

Given the reviewed findings, I expect participants who experience positive emotions to broaden one's ability to seek and learn new strategies, connect with their partner, and ultimately achieve effective social coordination. Unique to this study is that the positive emotions are elicited in a relationship-specific context of induced partner connectivity, thereby laying the foundation for a relationship-specific resource of dyadic social coordination. Thus, inherent to the hypotheses of this study is the idea that positive emotions

elicited within a high-connectivity context function to facilitate interpersonal interactions both during the social exchange and later as an enduring social resource.

CHAPTER 5

SELF-REGULATORY RESOURCES AS A CRITICAL ANTECEDENT TOWARD TO SOCIAL COORDINATION

The interpersonal processes that take place within a relationship may also stem from the intrapersonal processes embedded within the interaction. In other words, what each person individually contributes to the interaction can influence how a dyad performs. In an unpublished study of positive emotions and social coordination, Fredrickson and colleagues (2006) recruited pairs of same-sex strangers for a lab study. The participant dyads were randomly assigned to engage in either a positive emotion-based connectivity task, designed to generate positive emotions and induce closeness, or a neutral emotion-based connectivity task, wherein the participants proofread a scientific article together. Then, following the procedure of Cohen and Bacdayan (1994), they played the previously mentioned cooperative card game together. Contrary to expectations, the researchers found no main effect of positive emotion-based connection on dyadic card game performance, compared to those who shared a neutral experience. However, participant pairs who shared the positive emotion-based connection *and* had higher combined baseline energy ratings developed efficient and elegant social coordination during card game play. In other words, there was an interaction effect between positive emotions and energy on social coordination. It seems that participants who arrived at the lab with higher levels of energy were able to extract more from the positive emotion-based connection with their partner and thus, perform better together on the card game.

Why might this be? I propose that the key is one's stock of self-regulatory resources. Self-regulatory resources are described as a type of mental, or psychological, energy that one exerts when overriding one's own initial response. Across four laboratory studies, Muraven, Tice, and Baumeister (1998) supported their *strength model of self-regulation*, which posits that one's ability to self-regulate decreases over time since it relies on a limited self-regulatory resource capacity. The strength model suggests that each person is equipped with a particular amount of self-regulatory resources, which depletes with the exercise of self-regulation over a given period of time, and thus results in decreased ability to self-regulate on a subsequent task. However, similar to the use of physical strength or energy, this depletion effect is temporary. Various laboratory studies have shown that one's depleted state can be replenished by rest (Muraven, Tice, & Baumeister, 1998), positive emotions (Tice & Wallace, 2000; Tice, Baumeister, Shmueli, & Muraven, 2007), and even the consumption of glucose (Gailliot, Baumeister, DeWall, Maner, Plant, Tice, Brewer, & Schmeichel, 2007). Drawing on the idea that self-regulation relies on a mental energy source, I speculate that in Fredrickson, et al.'s unpublished study previously mentioned, individuals who arrived with higher baseline energy had sufficient self-regulatory resources, which made them better able to put oneself aside and attend to their partner in order to achieve social coordination.

Another connection between intrapersonal self-regulation processes and interpersonal interactions is that high-maintenance interactions result in self-regulatory failure (Finkel, Campbell, Brunell, Dalton, Scarbeck, & Chartrand, 2006). As described by Finkel, et al., *high-maintenance interactions* are those in which achieving social coordination on a task consumes more energy than the task actually requires. This research suggests that interpersonal interactions rely on self-regulatory resources as fuel for smoothness and coordination. Thus, complementary to how interactions can be depleting, being depleted

may affect how one engages in a social interaction. Therefore, as a follow-up to Fredrickson, et al.'s (2006) finding that positive emotions interact with energy finding, I aim to test how being low on self-regulatory resources will affect participants during a social interaction, and ultimately interfere with achieving social coordination with their partner. In other words, I expect that having a "full tank" of self-regulatory resources combines with the positive emotions generated in an interpersonal interaction to facilitate effective social coordination.

CHAPTER 6

THE PRESENT STUDY

The present study seeks to further explore the interaction effect between positive emotions and energy on achieving social coordination, as a follow-up to the empirical findings from Fredrickson, et al.'s 2006 unpublished study. By directly manipulating self-regulatory resources in participant dyads, along with the emotions felt in an interaction, I first hypothesize a main effect of positive emotions on social coordination, as indexed by behavioral measures of Cohen's card game procedure (discussed above), as well as self-report measures completed once the game is complete (H1). More specifically, I predict that dyads who experience positive emotions elicited during a positive emotion-based connection will achieve and sustain efficient and elegant social coordination, compared to those who share a neutral emotion-based connection. Note that although this main effect was not found in the previous Fredrickson, et al. study, I find it worth retesting.

As for the role of self-regulatory resources, I hypothesize a significant interaction effect between adequate self-regulation resources and a positive emotion-based connection on social coordination (H2). Put another way, I predict that being stocked on self-regulatory resources can facilitate a dyad's achievement of social coordination, but the positive emotions evoked during a partner connectivity task is also necessary. Thus, the association between self-regulatory resources and social coordination is dependent on the presence of positive emotions (of a positive emotion-based connection).

Three exploratory sets of internal analyses are also considered in this study, primarily as alternate ways to test the hypotheses. More specifically, self-reported levels of emotion and self-regulatory resources will be used as predictors of social coordination, rather than experimental condition.

CHAPTER 7

METHODS

Participants

Participant recruitment and data collection began in June 2008 and continued through mid-August 2008 using posted advertisements around the campus community and emails sent to student listserves. In all, 23 pairs were recruited; each participant was compensated with $25 for participating, and earned an additional $16-24 based on their card game performance (more details follow in the *Measures* section). From late August 2008 through April 2009, an additional 74 participant pairs were recruited from the University of North Carolina, Chapel Hill, Psychology Department's Human Participation in Research (HPR) participant program. Participants recruited from the HPR program were compensated with course credit instead of $25 base pay and also earned the additional $16-24 based on card game performance with their partner. A combined total of 97 same-sex participant pairs were recruited for the laboratory study from the two waves of recruitment. Of the 97 pairs, 41 were male and 56 were female; the average participant age was 19.39 years.

Procedure

Participants arrived and were seated facing each other at approximately a 45-degree angle in a small, comfortable and well-lit room. Two bookshelves supported video cameras that unobtrusively recorded each of the participants from the torso up with both video and audio in order to later code nonverbal behavior and affective cues. Additionally, the cameras

were necessary in order to monitor the participants throughout the experiment for task completion and allowed them to contact experimenters with questions had they arisen. After participants were briefed on the study procedures and provided consent, psychophysiological sensors were placed on them by trained experimenters. In all, finger pulse, heart rate, and respiratory sinus arrhythmia—each physiological measures of autonomic nervous system activity that fluctuate involuntarily—were recorded at various points during the study. However, both the video and psychophysiological recordings are not a part of the present study's central analyses, and therefore will not be discussed. Participants first completed a baseline set of web-based questionnaires assessing affect and various personality factors for approximately five minutes. For all questionnaire portions of the study, a privacy screen was pulled down between the participants and they were asked to refrain from discussing any questionnaire content.

Prior to the study, each pair was randomly assigned to one of four conditions based on a 2 (self-regulatory resources (SRR): depleted vs. neutral) x 2 (emotion-based connectivity (EC): positive vs. neutral) design. Participants first completed the SRR state task individually, with the privacy screen down. In the SRR-depletion task, participants were given an article of emotionally-neutral text and asked to systematically cross out every "e" on the page for five minutes. Participants were then given a second article and asked to cross out every "e", unless the letter was next to another vowel or only one letter away from another vowel, for another five minutes (Tice, Baumeister, Shmueli, & Muraven, 2007). In the SRR-neutral task, participants were presented with 10-by-10 grids of random letters and asked to circle any pairs of the same letter they saw. They were informed to move along to the successive letter grids at whatever pace was most comfortable for a total of ten minutes (Isen, 2007).

Following the SRR manipulation, participants engaged in an EC task with their partner. If the pair had been randomly assigned to the EC-positive task, they asked and answered to each other a series of provided question prompts. Example items included: "Given the choice of anyone in the world, whom would you want as a dinner guest?"; "Do you have a secret hunch about how you will die?"; and "What is the greatest accomplishment of your life?" As shown in work by Aron, et al. (1997), this task induces closeness in an experimental context; I used it here with the intention of creating a shared, context-specific positive emotion and connectivity within participant dyads—an idea that is implicit in "icebreaker" activities designed to facilitate team- and relationship-building (Aron, 2000). The EC-positive task lasted for 20 minutes. Each participant pair assigned to the EC-neutral condition proofread an article of emotionally-neutral text together. One participant would read an "edited" version of the article to her partner, pointing out spots that required edits (e.g., italicizations, strikeouts, boldings); on an "unedited" version of the article, the other participant would make the changes as described by her partner. After 10 minutes, the two participants would switch versions of the article with one another, and continue to proofread for another 10 minutes in their new roles. Thus, the two EC experimental conditions include a component of turn-taking and connectivity between the participants, but whereas the EC-neutral task is designed to not generate any felt emotions, the EC-positive task is designed to elicit positive emotions within a specific context of interpersonal connectivity.

Instructions for each of the tasks were given via a video that the experimenter queued up for the participants, to ensure double-blindness of conditions among the participants and experimenter. After the EC task, participants completed another battery of questionnaires evaluating their feelings and levels of partner connectivity for approximately five minutes.

Each dyad was then introduced to the rules and roles of Cohen's (1994) card game procedure. The aim of the game for each dyad was to work together to get a particular card (e.g., the red 2) into a "target" spot in as few total "moves" as possible. One participant had the role as the "number keeper" and the other as the "color keeper"; the color keeper could only exchange cards with the target card when the card he held matched the color of the target card, whereas the number keeper could only exchange cards with the target card when the card he held matched the number of the target card. For each completed hand, the participant pair earned $1, and $0.10 was deducted for each move made to successfully complete the hand. Given this dyadic level monetary incentive, participants were not in competition; they worked to make money as a team, and split their total earnings down the middle at the end of the study. The rules thus gave the participants two incentives to balance: because moves cost money, they had to work together to complete each hand in the least number of moves possible, but at the same time, they wanted to play fast enough to be able to attempt and complete a possible 40 hands in 40 minutes. The game ended once participants completed 40 hands or reached 40 minutes of play, whichever occured first. Although the game was introduced and demonstrated using actual playing cards, the game was played through a computer interface. The laptop computer screens through which the game was played were positioned such that participants could not see one another's cards, and participants were restricted from talking with one another during card play. Lastly, participants completed a set of questionnaires assessing their feelings, levels of partner connectivity, and ratings of how the card game went. This final battery of questionnaires required approximately 10 minutes to complete.

One week later, the participants returned to the lab to play another 40 minutes or 40 hands (whichever occurred first) of the card game with their original partner with two new

rules: 1) the participants switched roles as color keeper and number keeper, and 2) a different card (e.g., the black 2) was designated as the target card that completed each hand when placed in the target position. (These minor changes are introduced at Week 2 based on the idea that features of routinization found in social coordination rely on procedural memory, and past studies have found that although pairs require a few card hands to get accustomed to the slight game modifications, their ability to achieve social coordination during the game is not significantly altered.) Once card game play ended, participants completed a final battery of questionnaires for about 10 minutes evaluating their affect, levels of partner connectivity, and how the card game went. Then participants were thanked and provided a verbal debriefing of both Week 1 and Week 2 sesssion.

Measures

Affect and Energy

Affect Grid (Russell, 1980). The Affect Grid is a single-item questionnaire that asks participants to rate how they are feeling based on two dimensions. One dimension is based on how much energy they are feeling (e.g., high energy, low energy) and the other relates to their current mood (e.g., pleasant, unpleasant). Participants used a 9-point scale that ranges from -4 to 4 for each dimension; a rating of 0 on both dimensions constitutes a neutral state on both dimensions. The Affect Grid was administered to participants at baseline, and immediately after the SRR task, EC task, and card game play.

Activation-Deactivation Adjective Checklist (ADA-CL; Thayer, 1986). The ADA-CL is a self-report measure that assesses one's arousal level. It captures varying levels of high energy (e.g., energetic, lively, vigorous) and low energy (e.g., placid, sleepy, still). Participants completed the ADA-CL before and after the SRR task, and again after the EC task ($\alpha = .84$, after SRR task).

Modified Differential Emotions Scale (mDES; Fredrickson, Tugade, Waugh, & Larkin, 2003; Original DES: Izard, 1977). The mDES asks participants to rate 20 different emotions categories based on how they felt while interacting with the other study participant during th EC task. This measure is used to index positive and negative emotions using a 9-point scale (0 = "none"; 8 = "a great deal"). Positive items include "I felt content, serene, peaceful" and "I felt interested, alert, curious"; negative items include "I felt angry, irritated, frustrated" and "I felt contemptuous, scornful, disdainful" (α = .89, after EC task).

Partner Connectivity

High-Quality Connections (HQC; Dutton & Heaphy, 2003). The HQC measure is comprised of three subscales: subjective vitality (e.g., "I felt alive and vital"), positive regard (e.g., "My partner was friendly and warm toward me"), and felt mutuality (e.g., "When I was interacting with my partner, there was a shared flow of thoughts and feelings"). Together, these scales capture subjective feelings of emotional connectedness and involvement within an interpersonal interaction. Respondents completed the HQC measure after the EC task using a 7-point Likert scale, ranging from -3 ("strongly disagree") to 3 ("strongly agree"), to rate each statement (α = .91, after EC task).

Social Coordination

Card Game Performance Measures (Cohen & Bacdayan, 1994). Social coordination is behaviorally indexed based on how each pair performs on the card game. This study assess two types of social coordination: 1) efficient and 2) elegant. Since there is monetary incentive to complete as many hands as possible in the least amount of moves, then the total amount of time and the total number of moves each pair uses to complete their hands are used as proxies for efficient social coordination.

Elegant social coordination is assessed by the total number of times each pair utilizes a special sequence of moves known as "up-up-anything-target" (UU*T). This series, or "chunk", of moves has been found by Cohen and Bacdayan (1994) to develop as a stable action pattern over time that involves the anticipated actions of both partners, in contrast to a "one move at a time" type of play. Using a UU*T action sequence conserves both time and moves necessary to complete a hand.

Proportional variables were calculated based on total time, total number of moves, and total number of UU*T action sequences played to account for card game malfunctions, which disrupted participants' play, and in some cases, hindered them from being able to attempt all 40 hands. Efficient social coordination is indexed by a ratio of: total hands completed/total time, and total moves/total hands completed. Elegant social coordination is indexed by a ratio of: UU*T/total hands completed, and UU*T/total moves.

Card Game Self-Report Measure (based on work by Cohen & Bacdayan, 1994). Overall social coordination (i.e., efficiency and elegancy are not differentiated) was assessed each week through participants' self-report after card play. Participants completed the entire questionnaire developed by Cohen and Bacdayan (1994); however, I conducted an exploratory factor analysis for purposes of data reduction (Gorsuch, 1983) since the original questionnaire is unpublished and in its primary stages as a social coordination measure. A sum score was calculated based on a total of 27 items, each of which loaded onto the first of two extracted factors with an eigenvalue greater than .589 using a direct oblimin rotation. Based on the factor analysis, the 27 items together account for 33.69% of the variance in social coordination (as measured by the original questionnaire in its entirety.)

Individually, participants evaluated their playing performance and how they felt "early" and "late" in the game, using a 7-point scale with ratings from 1 ("almost never") to 7

("almost always"). Example items include: "I anticipated what my partner would do", "I felt that I played the game efficiently", and "My partner helped me". There are also two items that ask participants how aware they were of their partner's intentions and reactions to game moves, using a 7-point scale (1 = "not very aware"; 7 = "very aware") (α = .87, after Week 1 card play; α= .93, after Week 2 card play).

CHAPTER 8

RESULTS

Overview

A total of 97 participant pairs were recruited for this study; however, data of three pairs were dropped from current analyses because they did not return for their Week 2 session, and data of another 17 pairs were dropped due to connection errors with the server that hosted the card game. Thus, the analyses here considers a total of 77 participant pairs who completed both Week 1 and Week 2 sessions, and within each session, completed at least 30 hands uninterrupted by card game malfunctions. Note that all 97 pairs were considered for manipulation checks, as complications with the card game did not arise until after the experimental manipulations.

To test the effectiveness of each experimental manipulation, I fit a series of multilevel models with individuals nested within dyads (Hox, 2002). In the SRR manipulation, the use of multilevel modeling accounts for any variance of individual energy ratings due to participant pairing and baseline reports of energy. Individual's ratings of energy at baseline and SRR experimental condition were entered as predictors of individual's ratings of energy immediately after the SRR manipulation. Similarly, a series of multilevel models with individuals nested within dyads was used to test the effectiveness of the EC manipulation; with the use of multilevel modeling, any variance of individual emotion valence due to participant pairing and baseline reports of emotional valence is accounted for. Individual's

ratings of emotion valence at baseline and EC experimental condition were entered as predictors of individual's ratings of emotion valence immediately after the EC manipulation. And, given that the EC-positive task was designed to induce positive emotions *and* partner connectivity as a specific context for them to arise in, a final multilevel model was fit, with SRR and EC experimental conditions and post-EC affect scores entered as predictors of HQC scores collected immediately after the EC manipulation.

Multilevel modeling was also used in the central analyses of this study, which tests effects of SRR condition, EC condition, and time on social coordination. There are a total of five models nesting time within dyad, each with a different dyadic level outcome variable of social coordination: Models 1-2 test efficient social coordination (behavioral outcomes), Models 3-4 test elegant social coordination (behavioral outcomes), and Model 5 tests overall social coordination (self-report outcomes). Each model began with main effects of SRR condition (SRR-neutral = 0; SRR-depleted = 1), EC condition (EC-neutral = 0; EC-positive = 1), and time (Week 1 = 0; Week 2 = 1), and interaction effects of time x SRR condition, time x EC condition, and time x SRR condition x EC condition as predictor variables (from herein called the "default predictors"). In all models except for Model 5, each of the interaction terms were ultimately dropped to avoid model over-specificantion since no significant results showed for any of them. Results are presented in Table 1 and described below in terms of each stated hypothesis.

Manipulation Checks

Do participants' energy levels decrease as a result of the SRR-depletion task? The first experimental manipulation was that of self-regulatory resources: participants were assigned to either an SRR-depleting task, or a SRR-neutral task. Contrary to expectations, the results of a multilevel model show that SRR condition does not significantly predict

participants' Affect Grid arousal ratings assessed immediately after the SRR manipulation (b = .203, SE = .196, p = .303). In addition, results of a second multilevel model show that SRR condition does not significantly predict participants' ratings of energy on the ADA-CL (b = 1.937, SE = 1.401, p = .170). Overall, it does not appear that the SRR-depletion manipulation was effective in depleting participants' energy levels.

Do participants' levels of positive emotions increase as a result of the EC-positive task? Each participant pair was also randomly assigned to either the EC-positive task (designed to induce positive emotions in tandem with partner connectivity) or the EC-neutral task. The results of a multilevel model show that EC experimental condition significantly predicts Affect Grid emotion ratings after the EC task (b = 1.000, SE = .184, p < .0001), such that those in the EC-positive condition on average would self-report more positive emotions compared to participants in the EC-neutral condition. Moreoever, the results of another multilevel model show that EC condition significantly predicts post-EC task mDES positive emotion scores (b = 23.337, SE = 2.552, p < .0001), such that those in the EC-positive condition on average would rate feeling more positive emotions after the task compared to participants in the EC-neutral condition. Emotion-based connectivity condition, however, does not predict post-EC mDES negative emotion scores (b = .034, SE = .737, p = .964), which speaks to the influence of the EC-positive task's specificity in manipulating one's amount of experienced *positive* emotions. Note that there were also no significant interaction effects of SRR x EC condition on participants' emotion ratings. Overall, it appears that the EC-positive manipulation was effective in inducing participants' levels of positive emotional experience.

Do participants' levels of connectivity increase as a result of the EC-positive task? Results of a multilevel model used to check that partner connectivity (in tandem with positive

emotions) was induced in the EC-positive task indicate that EC experimental condition significantly predicts HQC scores assessed after the EC task (b = 2.905, SE = .338, p < .0001), such that those in the EC-positive condition on average would self-report higher levels of partner connectivity compared to participants in the EC-neutral condition. Furthermore, Affect Grid emotion ratings after the EC task significantly predict HQC scores collected after the EC task (b = .530, SE = .101, p < .0001), such that participants who reported more positive emotions after the EC-positive task also reported higher levels of connectivity on the HQC measure. These results suggest that positive emotions, specifically under a context of felt connectivity, was successfully elicited via the EC-positive task.

Central Analyses

Social coordination improves over time. Although no hypotheses were formulated for effects of time, it is worth noting that time emerges as a significant predictor of all social coordination measures. That is, all participant pairs—regardless of SRR or EC experimental condition—performed with higher levels of efficient and elegant social coordination, and reported higher levels of social coordination at Week 2, compared to Week 1. Such findings are expected, based on Cohen & Bacdayan (1994) and Fredrickson, et al's (2006) previously mentioned work on social coordination. More specifically, behaviors associated with social coordination tend to be stored as procedural memory, and thus, tend to become smoother and easier for one to perform over time.

Hypothesis 1: The effect of positive emotions on social coordination. Hypothesis 1 predicted a main effect of positive emotions (specifically elicited during a positive emotion-based connection) on social coordination, such that pairs who experience a positive emotion-based connection will show higher performance on the card game and report higher levels of social coordination, compared to pairs who experience a neutral emotion-based connection.

Based on results from the five multilevel models used to test this hypothesis, however, EC condition does not significantly predict any behavioral or self-report measures of social coordination (Model 1: b = .030, SE = .033, p = .3677; Model 2: b = .065, SE = .091, p = .4808; Model 3: b = -.002, SE = .003, p = .4345; Model 4: b = -.011, SE = .014, p = .3902; Model 5: b = -5.309, SE = 3.452, p = .1283). Thus, participant pairs who received the EC-positive manipulation (and thus experienced more context-specific positive emotions) prior to playing the card game did not perform better on the card game, nor report higher levels of social coordination, compared to those who received the EC-neutral manipulation, at neither the first or second week.

Hypothesis 2: The effect of self-regulatory resources x positive emotions on social coordination. Hypothesis 2 predicted an interaction effect between self-regulatory resources and positive emotions on social coordination, such that pairs who have adequate self-regulatory resources *and* experience positive emotions will show higher levels of social coordination. Across all five regression models, there was no significant interaction effect of SRR x EC experimental conditions in predicting any measures of social coordination[1]. Based on results from the five multilevel models used to test this hypothesis, then, participant pairs who received the SRR-depletion manipulation *and* EC-positive manipulation prior to playing the card game did not perform better on the card game, nor report higher levels of social coordination, compared to pairs who received the SRR-neutral manipulation. However, a marginally significant main effect of SRR condition on efficient social coordination emerged in Model 2 (b = -.164, SE = .091, p = .0772) after all the interaction terms were removed as predictors, and there was a significant effect of time x SRR condition on self-reported social coordination in Model 5 (b = -6.829, SE = 3.340, p = .0444). Note, however, that these two findings are inconsistent with one another in terms of profiling social

coordination. Whereas the main effect finding in Model 2 suggests that participant pairs low on self-regulatory resources actually achieved more efficient social coordination (i.e., they used fewer moves over all hands played compared to pairs who did not receive the depletion manipulation), the significant interaction effect found in Model 5 suggests that, compared to pairs who were not depleted on self-regulatory resources, pairs who received the depletion manipulation reported a significantly *lower* score on self-reported social coordination at Week 2 compared to Week 1.

Internal Analyses

Given that no clear pattern of results or trends emerged from formally testing Hypotheses 1 and 2, an exploratory set of internal analyses are considered here. That is, instead of predicting social coordination outcomes using *manipulated* SRR and positive emotions, the internal analyses take advantage of *measured* SRR and positive emotions. Although using measured predictors will not allow for any causal claims about antecedents of social coordination, results from these internal analyses provide an altenative way to test the hypotheses, and may provide insight into potential incongruencies between the experimental manipulations and measures used to assess their effectiveness. For example, recall that the SRR manipulation did not appear to be effective (as measured by arousal ratings on the Affect Grid and ADA-CL). Should participant scores on the Affect Grid significantly predict social coordination, then it is perhaps the case that the experimental conditions manipulated a phenomena other than SRR, or that the measures were not ideal for capturing one's SRR.

Identical to the set of five multilevel models fitted to test Hypotheses 1-2 in Central Analyses, each set of models here consists of a model for each social coordination outcome variable (Model 1: total hands played/total time played, Model 2: total moves played/total

hands played, etc.) Also similar to the previous models, each model here began with the full default set of predictor variables and was pared down to just main effects if no significant interaction effects emerged. However, the predictor variables differ from Central Analyses such that each internal analysis consists of a modified combination of manipulated and measured variables. Internal Analysis A retains manipulated SRR condition as a predictor, and instead of using (manipulated) EC condition as a predictor, average pair emotion valence scores on the Affect Grid assessed immediately after the EC task represent positive emotions. The predictor variables of Internal Analysis B are manipulated EC condition and average pair energy ratings on the Affect Grid assessed immediately after the SRR manipulation. And finally, the predictors of Internal Analysis C are both measured variables: average pair emotion valence scores on the Affect Grid immediately after the EC task, and average pair energy ratings on the Affect Grid immediately after the SRR manipulation.

Internal Analysis A: Manipulated SRR, measured positive emotions. As seen in Table 2, the results of Internal Analysis A mirrors that of the multilevel models fit in Central Analyses. First, time again emerges as a significant or marginally significant predictor of all social coordination measures: all participant pairs (regardless of measured positive emotions and SRR experimental condition) performed with higher levels of efficient and elegant social coordination, and reported higher levels of social coordination at Week 2, compared to Week 1. And similar to results of entering EC condition as a predictor, results of entering measured positive emotions also do not support Hypothesis 1 (Model 1: b = .010, SE = .016, p = .5052; Model 2: b = .032, SE = .043, p = .4651; Model 3: b = -.001, SE = .001, p = .3635; Model 4: b = -.004, SE = .007, p = .5159; Model 5: b = .240, SE = 1.541, p = .8766). Hypothesis 2 also remains unsupported by entering measured positive emotions into the five regression models: there was no significant interaction effect of SRR x positive emotions in

predicting any measures of social coordination[1 Error! Bookmark not defined.]. However, the two contradicting findings involving SRR again emerged: a marginally significant main effect of SRR condition on efficient social coordination emerged after all the interaction terms were removed as predictors in Model 2 (b = -.159, SE = .0092, p = .0877), and there was a significant effect of SRR condition x time on self-reported social coordination in Model 5 (b = -6.769, SE = 3.346, p = .0467). These findings suggest that behaviorally, participant pairs low on SRR actually achieved more efficient social coordination, yet they also reported a significantly lower score on social coordination at Week 2 compared to Week 1. Results of Internal Analysis A suggests that using measured positive emotions rather than manipulated EC as a predictor variable does not seem to make a difference in predicting social coordination.

Internal Analysis B: Measured SRR, manipulated EC. This second set of internal analyses explores how using measured SRR, rather than manipulated SRR, as a predictor variable may be more appropriate in predicting social coordination. As shown in Table 3, time again emerges as a significant predictor of all social coordination measures, and both hypotheses again go unsupported. Emotion-based connection condition does not significantly predict any behavioral or self-report measures of social coordination (Model 1: b= .032, SE = .033, p = .3352; Model 2: b = .061, SE = .093, p = .5134; Model 3: b = -.002, SE = .003, p = .3977; Model 4: b = -.011, SE = .014, p = .4429; Model 5: b = -4.044, SE = 2.169, p = .0662). Interestingly, there is a main effect of EC condition on self-reported social coordination in Model 5 that is contrary to expectations, such that participant pairs who received the EC-positive manipulation reported less social coordination compared to those who received EC-neutral, regardless of Week 1 or 2. Based on these models, there are no

significant interaction effects of SRR x EC condition, nor any main effects of SRR after all interaction terms are dropped as predictor variables.

In summary, using measured SRR seems less appropriate in predicting social coordination than manipulated SRR. Whereas multilevel models that included manipulated SRR as a predictor variable (i.e., Central Analyses, Internal Analysis A) showed some evidence of SRR's effect on social coordination, no such significant results arise from this set of internal analyses that included measured SRR as a predictor. A similar pattern of nonsignificant results show in the final set of Internal Analyses where both measured SRR and measured positive emotions are entered as predictors, as described below.

Internal Analysis C: Measured SRR, measured positive emotions. In the final set of internal analyses, both measured SRR and measured positive emotions are entered as predictors. Aside from the replicated pattern of the main effect of time on social coordination, there are no other significant results. Social coordination improves over time—as assessed via performance and self-report—regardless of their self-reported levels of SRR and positive emotions, but Hypotheses 1 and 2 remain unsupported. There are no interaction effects of measured SRR and positive emotions on social coordination to support Hypothesis 2[1]**Error! Bookmark not defined.**, and as shown in Table 4, there are no main effects of measured positive emotions (nor measured SRR) after all interaction terms are removed as predictor variables to support Hypothesis 1. Such results suggest that the combination of both measured SRR and measured positive emotions as predictors of social coordination among participant dyads may be the least useful or appropriate.

[1] Although regression statistics (e.g., beta weights, standard errors, *p*-values) of models with interaction terms included as predictors are not reported here, they are available upon request.

CHAPTER 9

DISCUSSION

The primary aim of this study was to test the effects of positive emotions and self-regulatory resources on the interpersonal phenomenon of social coordination. In a lab study, participants engaged in three main tasks: (1) individually, a depleting self-regulatory resource task or neutral self-regulatory resource task, (2) with an unacquainted study partner, a positive emotion-based or neutral-emotion based connection task, and (3) also with their study partner, participants played a card game designed to gauge how well they socially coordinated with one another. Participants then returned to the lab one week later to play a second round of the card game with the same partner. A series of multilevel models tested the main and interaction effects of manipulated self-regulatory resources and positive emotions on social coordination: two models predicted (behavioral) efficient social coordination, another two models predicted (behavioral) elegant social coordination, and one model predicted (self-reported) overall social coordination.

First, although no hypotheses were formulated for effects of time, it is worth noting that a significant main effect of time emerged on all measures of social coordination. That is, all participant pairs performed with higher levels of efficient and elegant social coordination, and self-reported higher levels of overall coordination, at the end of Week 2. This result was found among all participant pairs, regardless of the self-regulatory resources condition and emotion-based connection experimental condition they were randomly assigned to. Such

consistent findings replicate Cohen and Bacdayan (1994) and Fredrickson, et al.'s (2006) previous studies of social coordination, thereby supporting the idea that routinized action sequences characteristic of social coordination are indeed stored as procedural memory. The significant effects of time also validate the self-report questionnaire of game play as an index of social coordination, and the card game itself as a behavioral measure of social coordination. Both the construct and measure of social coordination, then, are validated by this study.

However, no results confirmed Hypothesis 1, which predicted that pairs who were manipulated to experience positive emotions specifically elicited during a connectivity task would achieve efficient and elegant social coordination during game play and also report more feelings of coordination with their partner after playing their game. These null results replicate those of Fredrickson, et al.'s (2006) unpublished study, which also based the EC-positive task on Aron's work (1997) and used the card game as a behavioral index of social coordination. The results of three sets of internal analyses, which tested the hypotheses by considering the effects of both manipulated and measured positive emotions, also failed to support Hypothesis 1.

Nevertheless, the null findings here do not discount the function of positive emotions, as evidenced by a host of past and current studies. Unique to this study is that the positive emotions were not induced in people participating in isolation; rather, the emotions were elicited within dyads under a relationship-specific context in order to parallel the emotions' function of creating a relationship-specific resource of dyadic social coordination. Perhaps it is the case that inducing positive emotions within a dyadic context does not have as robust and lasting effects on one's thoughts and behaviors as inducing positive emotions in an isolated context.

Hypothesis 2 considered the role of self-regulatory resources in how a pair achieves social coordination. It was predicted that having a "full tank" of self-regulatory resources would facilitate social coordination, but only if positive emotions were also present. Based on results of both Central and Internal Analyses, no results reached significance to support Hypothesis 2. However, two contradicting findings emerged in Models 2 and 5 of both Central Analyses and Internal Analysis A: there was a significant interaction effect suggesting that pairs depleted on self-regulatory resources at Week 1 felt less coordination during card play at Week 2, yet there was also a marginally significant main effect suggesting that depleted pairs performed more efficiently on the card game during both rounds of card play. Since these contradicting findings emerged in two sets of analyses that considered manipulated (rather than measured) self-regulatory resources as a predictor variable, it suggests a specific effect of the manipulation itself. So, given that the manipulation checks for self-regulatory resources did not reach significance, it may or may not be self-regulatory resources per say driving the contradicting effects. In other words, whatever phenomenon the self-regulatory resources depleton task manipulated—be it self-regulatory resources or not—is driving the contradicting effects.

The lack of empirical support for Hypothesis 2, together with the failed self-regulatory resources manipulation check, also suggests a mismatch in the experimental manipulation itself and the measures used to assess self-regulatory resources. The SRR-depletion task was adapted from an extensive line of research that behaviorally manipulates and assesses self-regulatory resources (e.g., Muraven, Tice, & Baumeister, 1998; Tice, Baumeister, Shmueli, & Muraven, 2007). However, the measures used as an index of how repleted of self-regulatory resources one felt were adapted from research on emotions and the arousal dimension of emotions (Russell, 1980; Thayer, 1986). Perhaps it is the case, then,

that no findings reached significance to support Hypothesis 2 because of a mismatch between the experimental manipulation and its measures. Whereas the experimental manipulation task operated on mental energy, the Affect Grid and ADA-CL measures are more indicative affective energy. The incongruency in experimental manipulation and its measures does not undercut their effectiveness, but does highlight the uniqueness of each phenomenon and precision necessary in selecting appropriate measures.

Overall, the results speak to the complexity of the fundamentally interpersonal phenomenon of social coordination, and its antecedents at both the individual and multi-actor level. That is, intrapersonal phenomena, such as SRR and positive emotions, may be just as influential on social coordination as interpersonal phenomena, such as shared positive emotions and partner connectivity. It will be imperative for future studies to refine and disentangle how factors at various levels impact social coordination.

Strengths and Limitations

Since this study is designed to capture a phenomenon that unfolds over an extended amount of time, it was challenging to create the short, one-hour study that is commonplace in social psychology. Instead, each experiment session lasts nearly four hours, split across two weeks. The strengths and limitations of this study stem from the longitudinal property of the social coordination phenomenon.

First, the lengthy study design presents a concern for the participants' response behavior. In any given laboratory study, participants are potentially vulnerable to factors like demand characteristics, response bias, social desirability, and/or fatigue. Since this study runs over a longer period of time and comprises of multiple questionnaire batteries in one sitting, participants may over time succumb to undesirable response behaviors. In other

words, the chances of these response behaviors arising during this study thereby increases with each task and questionnaire administered.

Second, the study length may have interfered with the durability of manipulated emotional and arousal effects. For example, it is possible that intended emotional effects of the EC-positive condition were evoked but did not last long enough to have an effect on card game performance, as there was a set of questionnaires and card game tutorial before actual card game play began. In other words, since emotions are often fleeting and short-lived, it is possible that any manipulated emotions and partner connectivity were erased before card game play even began.

Thirdly, a limitation arises from study length in combination with the use of several types of equipment involved in the experiment. In each session, video recording and psychophysiological equipment, and a remote network connection necessary for the card game, are involved. Given the length of the study and necessary instruments, the chances for at least one piece of the study protocol to present complications dramatically increases, thereby interrupting the trajectory of data collection.

But despite the limitations that study length presents, it also yields strengths. As mentioned earlier, social coordination is a phenomenon that unfolds over time. By integrating multiple methodologies (e.g., self-report, psychophysiology, video recording), there is an advantage of gaining insight and further unpacking social coordination in real time throughout the experiment. The various types of data can be investigated both independently (e.g., "What is the physiological profile of two people coordinating with one another?"; "What are the nonverbal correlates of two people coordinating with one another?"), and in tandem with one another (e.g., "In what ways can one's nonconscious physiological activity and nonverbal expressivity influence coordinating with another person?")

The array of both individual and dyadic level variables gathered over time is also a strength of the study, given that social coordination is a fundamentally interpersonal process. With multiple levels of data across two time points, a host of modeling techniques become powerful tools in helping to unpack and better explain social coordination. For example, the present study's data is appropriate for the Actor-Partner Interdependency Model (APIM; Kashy & Kenny, 2000), which takes advantage of the fact that each of the participants within a pair may have both unique and interdependent influences on dyadic level outcomes. And, given that participant pairs were recruited to the lab as strangers, the strengths of nonlinear dynamics modeling (Chow, Ram, Boker, Fujita, & Clore, 2005; Vallacher, Nowak, & Zochowski, 2005) offer a novel way of detecting how social coordination emerges and trends among pairs from their initial meeting as strangers at Week 1 through their second round of the card game a week later. Modeling the longitudinal data collected in this study can provide support for the "build" hypothesis of Fredrickson's (1998, 2001) broaden-and-build hypothesis, such that the positive emotions experienced during an emotion-based connection later endure as creators of a social resource (i.e., social coordination).

Future Directions

Many aspects of the dataset and outcomes from this study will be fruitful for future studies, even though they are not a part of planned analyses for this study in particular. First, psychophysiological measures of heart rate, finger pulse, and respiratory sinus arrhythmia (RSA) can nicely complement the self-report measures of emotion by indicating arousal levels (Levenson, 1992). In particular, what participants may not be able to self-report in terms of emotions are the patterns of activity happening under the skin that may be quite telling of their feelings. One specific future direction involves further investigation into participants' RSA patterns. The current RSA data can potentially be used at the individual

level as a physiological proxy of self-regulatory strength (Segerstrom & Nes, 2007) and the tendency for one to affiliate with others (Kok & Fredrickson, 2008); and at the dyadic level, the extent to which two participants' RSA patterns are synchronized may be associated with how well they cooperate as a team (Henning, Armstead, & Ferris, 2009; Trimmel, Henning & Fairclough, 2009).

In addition, video recordings of the participants during the EC manipulaton tasks and card game open doors to a plethora of nonverbal coding schemes, including indicators of love (Gonzaga, Keltner, Londahl, & Smith, 2001), social power and status (Tiedens & Fragale, 2003), and interactional synchrony (Bernieri & Rosenthal, 1991; Kimura & Daibo, 2006)—all of which would be powerful to show among new acquaintance dyads. Such analyses also hold potential for probing theories of behavioral mimicry (Bargh & Chartrand, 1999), subtle dynamics of emotion contagion (Hatfield, Cacioppo, & Rapson, 1993), and mindlessness in social interactions (Langer, Blank, & Chanowitz, 1978), and how these theories could be mechanisms by which people achieve efficient social coordination.

The theories and models tested in the present study can be used as a springboard to studying emotions at various levels and in different social contexts (Keltner & Haidt, 1999). After all, the interplay of emotions and social coordination exists in several everyday interpersonal contexts, such as sports teams, business teams, and group meetings. Moreover, the implications for research on emotions and social coordination extends to larger group settings that have a developmental impact. Understanding how a teacher and student experience positive emotions during an interaction, for example, may shed light on the processes underlying the dynamics of the entire classroom. Or, in the context of adolescent peer relations, understanding intra-individual self-regulation processes can help explain the outcomes of inter-individual group formation. And just as future studies can expand upon

the level of analysis, they can also build upon the length of the study. For instance, with more explicitly longitudinal studies, processes of interpersonal relationships and the durability of built resources can be assessed.

Although an unclear trend of results emerged from this study, I hope that future studies consider similar or revised methods to continue investigating the interplay of emotions and self-regulatory resources on social coordination, and to help broaden our understanding of how "me" can become "we".

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Table 1. Effects of Experimental Conditions and Time on Social Coordination

	Behavioral Measures				Self-Report Measure
	Efficient Social Coordination		Elegant Social Coordination		Overall Social Coordination
	Hands/time	Moves/hands	UU*T/moves	UU*T/hands	Dyadic Avg. Score
Predictor	β	β	β	β	β
Intercept	1.119**	5.692**	.056**	.316**	86.168**
SRR	.033	-.164[b]	-.00007	-.010	-2.388
EC	.030	.065	-.002	-.011	-5.309
Time	.261**	-.492**	.008**	.019[a]	8.875[a]
SRR x EC					3.314
Time x SRR					-6.829[a]
Time x EC					-.790

Note: SRR = Self-Regulatory Resources; EC = Emotion-based Connectivity;
** p <.0001; [a] p < .05; [b] p < .10

Table 2. Internal Analysis A: Effects of Manipulated SRR, Measured Positive Emotions, and Time on Social Coordination

	Behavioral Measures				Self-Report Measure
	Efficient Social Coordination		Elegant Social Coordination		Overall Social Coordination
	Hands/time	Moves/hands	UU*T/moves	UU*T/hands	Dyadic Avg. Score
Predictor	β	β	β	β	β
Intercept	1.113**	5.661**	.057**	.319**	83.033**
SRR	.035	-.159	-.0003	-.011	-1.202
PE	.010	.032	-.001	-.004	.240
Time	.261**	-.492**	.0083**	.0192**	7.479 [b]
SRR x PE					.258
Time x SRR					-6.769[a]
Time x PE					.500

Note: SRR = Self-Regulatory Resources; PE = Positive Emotions;
** p <.0001; [a] p < .05; [b] p < .10

Table 3. Internal Analysis B: Effects of Measured SRR, Manipulated EC, and Time on Social Coordination

	Behavioral Measures				Self-Report Measure
	Efficient Social Coordination		Elegant Social Coordination		Overall Social Coordination
	Hands/time	Moves/hands	UU*T/moves	UU*T/hands	Dyadic Avg. Score
Predictor	β	β	β	β	β
Intercept	1.142**	5.604**	.056**	.312**	83.345**
SRR	.017	-.015	.0004	.002	.379
EC	.032	.061	-.002	-.011	-4.044[b]
Time	.261**	-.492**	.008**	.019[a]	5.016[a]
SRR x EC					
Time x SRR					
Time x EC					

Note: SRR = Self-Regulatory Resources; EC = Emotion-based Connectivity;
** $p < .0001$; [a] $p < .05$; [b] $p < .10$

Table 4. Internal Analysis C: Effects of Measured SRR, Measured Positive Emotions, and Time on Social Coordination

	Behavioral Measures				Self-Report Measure
	Efficient Social Coordination		Elegant Social Coordination		Overall Social Coordination
	Hands/time	Moves/hands	UU*T/moves	UU*T/hands	Dyadic Avg. Score
Predictor	β	β	β	β	β
Intercept	1.142**	5.561**	.057**	.314**	81.970**
SRR	.016	-.018	.0005	.002	.405
PE	.008	.038	-.001	-.004	.694
Time	.261**	-.492**	.008**	.019[a]	5.016[a]
SRR x PE					
Time x SRR					
Time x PE					

Note: SRR = Self-Regulatory Resources; PE = Positive Emotions;
** p <.0001; [a] p < .05; [b] p < .10