Effects of Dysphoria on the Temporal Dynamics of Intimates' Interpersonal Behaviour

by

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I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

When romantic partners interact together, they continually respond to each other in ways that yield distinctive across-time patterns of behaviour. To illuminate specific ways in which dysphoria may influence the dynamics of marital communication, the present study investigated how dysphoria in either spouse may affect such across-time patterns of interpersonal behaviour. Using a computer joystick device, observers rated moment-to-moment levels of dominance and affiliation for each partner in videotaped conflict interactions, one preceded by a sad mood induction for the wife, and the other with no mood induction, of 60 romantic couples. As a measure of dysphoria, all participants completed the Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996). The data for each couple were then submitted to time series analyses, including regression and cross-spectral analysis. Results revealed that husbands' and wives' dysphoria had strongly differentiated effects on the marital interaction dynamics. Specifically, wives' dysphoria affected how dominance was handled between partners. Higher wife's dysphoria was significantly related to wife's change in dominance and inversely related to husband's change in dominance. That is, the higher the wife's dysphoria, the more dominant she became and the more submissive her husband became over the course of the interaction. In contrast, husbands' dysphoria affected affiliation patterns during conflict interactions. Higher husband's dysphoria was inversely related to both wife's change in affiliation and the couple's level of entrainment on affiliation. That is, the higher the husband's dysphoria, the less affiliative the wife became over time and the less entrained the partners were on affiliation. The wife's mood induction mostly had no effect on the interaction dynamics examined. In summary, wives' dysphoria tended to affect the dynamics of dominance during conflict interactions, whereas husbands' dysphoria tended to affect the dynamics of affiliation. The results shed new light on

the role each spouse may play in managing marital disagreements and how dysphoria disrupts

patterns of interpersonal behaviour in such interactions.

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Introduction

As romantic partners interact, they continually respond to each other in ways that yield distinctive dynamic (across-time) patterns of behaviour. When these dynamics go well, they are likely to contribute to partners' sense of closeness and satisfaction and their effectiveness in jointly solving problems. However, chronic mood difficulties in a partner may affect these dynamics in important ways. To illuminate specific ways in which dysphoria[1] may influence the dynamics of marital communication, the present study investigated how dysphoria in either spouse may affect moment-to-moment patterns of interpersonal behaviour in spousal interactions.

Interpersonal Theory

A useful theoretical framework for studying people's interaction behaviours is interpersonal theory (Carson, 1969; Kiesler, 1983, 1996). This theory is helpful both for indicating which interaction variables are most important to study and also for suggesting what patterns of association between partners to expect in these variables.

The main principle of interpersonal theory is that the most important distinctions in people's interpersonal behaviour tend to be captured by just two major orthogonal dimensions: dominance versus submissiveness, and affiliation versus hostility. These two dimensions may be depicted in a Cartesian plane with the vertical dimension representing dominance, with dominant at the top and submissive at the bottom, and the horizontal dimension representing affiliation, with hostile (or unfriendly) on the left and friendly on the right. These dimensions of dominance and affiliation have very broad relevance and are closely linked to Bakan's (1966) overarching meta-concepts of agency (i.e., need for autonomy) and communion (i.e., need for connection with others).

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A second key principle of interpersonal theory is that levels of dominance and affiliation tend to be related between people in lawful ways. This principle originated in the work of Sullivan and Leary. Sullivan (1953), focusing on reoccurring patterns of social relations, argued that interpersonal integration occurs when the behaviour of partners falls into a complementary pattern that is mutually satisfying and meets the needs of both individuals. Likewise, Leary (1957) proposed that "interpersonal reflexes tend … to initiate or invite reciprocal interpersonal responses from the 'other' person in the interaction that lead to a repetition of the original reflex" (p. 123). Leary argued that people's interpersonal behaviours convey important information about how one's social partners should respond, with each behaviour pulling for "complementary" subsequent behaviour from the other.

Carson (1969) and Kiesler (1983) clarified and elaborated this principle of interpersonal complementarity. In particular, complementary responses tend to be opposite ("reciprocal") with respect to the dominance dimension, but similar ("correspondent") with regard to the affiliation dimension. Interpersonal theorists suggest that when partners complement each other's behaviours, they experience a sense of self-validation and security (Carson, 1969; Kiesler, 1983; Tracey, 1994). A large body of research broadly supports the principle of interpersonal complementarity (see Sadler, Ethier, & Woody, 2011, for a review).[2]

The Role of Dominance and Affiliation in Romantic Relationships

The principle of complementary can be applied at the level of people's general interpersonal styles—that is, their characteristic trait levels of dominance and affiliation. For example, Markey and Markey (2007) examined how the complementarity of romantic partners' trait interpersonal styles was associated with relationship outcomes. They found that undergraduate men and women tended both to prefer as romantic partners those who had similar

personalities to their own, and also to wind up in such relationships. However, partners with the highest levels of relationship quality tended show a complementary association: although they tended to be more similar on affiliation, they tended to be more opposite on dominance, compared to couples with the lowest levels of relationship quality. This suggests that although single individuals desire romantic partners who have a similar personality to their own, those who experience the most satisfying relationships have partners with complementary interpersonal styles.

Alternatively, rather than being applied to study people's interpersonal traits, the principle of complementarity can be applied to examine the nature of interpersonal processes within an interaction. For example, we may ask what the probability is that a dominant act by one person will immediately be followed by a submissive act by the partner. Accordingly, one important research approach has been to segment an interaction into numerous separate acts and study the relations of an act to the immediately succeeding act over the course of an interaction (e.g., Hoyt, Strong, Corcoran, & Robbins, 1993; Strong, Hills, Kilmartin, et al., 1988; Tracey, 1994, 2004). Although this type of micro-event coding can be insightful, it has some disadvantages. One is that interaction behaviour tends to occur (and be experienced as) a continuous flow and it is difficult to relate the act-to-act level to this flow. Another disadvantage is that broader dynamic patterns in the interaction—that is, ones that unfold in time—are of great interest, but it is difficult to relate the act-to-act level to these dynamic patterns.

Rather than applying the principle of complementarity at the act-to-act level, Sadler et al. (2011) argued that it could be applied at other levels which are less microscopic and hold great promise for illuminating the interpersonal dynamics of interactions. Figure 1 uses oppositeness ("reciprocity") on dominance to illustrate these two levels. First, as depicted in the first panel,

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Figure 1. Basic types of complementarity as illustrated by reciprocity on dominance: Interdependent shifts and interdependent oscillations.

Interdependent Shifts
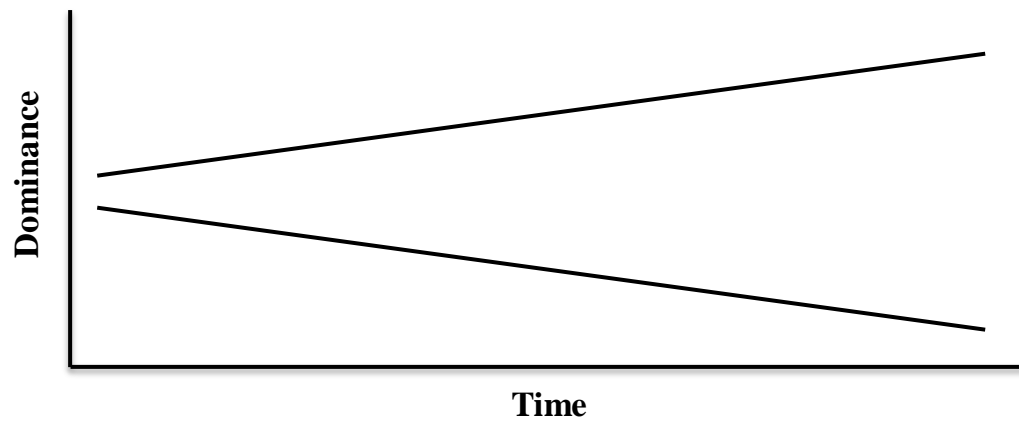
Interdependent Oscillations
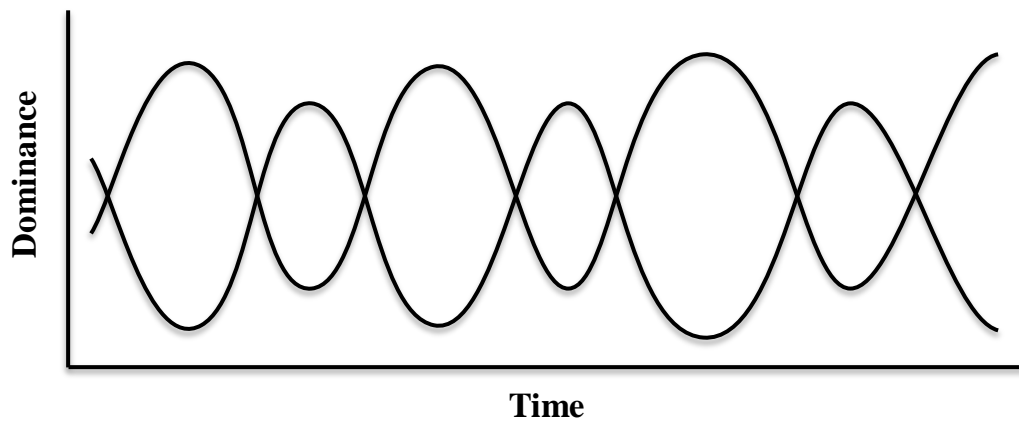
partners may show reasonably continuous shifts in their level of dominance, represented by a linear slope for each person. Interpersonal theory suggests that for dominance, these slopes should tend to be opposite for the two partners—e.g., a shift toward greater dominance in one person should tend to go with a shift toward greater submissiveness in the partner. Sadler and colleagues called this type of pattern "interdependent shifts." Second, partners may show entrained cycles, as shown in the second panel. As the graph suggests, partners may demonstrate coordinated rhythms, occurring reasonably regularly across time, in which as one partner behaves more dominantly, the other behaves more submissively, and vice versa. Sadler et al. (2011) called this type of pattern "interdependent oscillations." Their presence indicates entrainment between partners, in which variations in interpersonal behaviour become coordinated.

Sadler et al. (2011) also discussed a third level at which complementarity could occur during an interaction. Once overall shifts and oscillations have been removed from interaction data, there may be residual act-to-act relations that occur irregularly in time, which they called "interdependent bursts." However, because these residual act-to-act relations have no structure over time, they do not provide a way to characterize the interpersonal dynamics of interactions, unlike interdependent shifts and oscillations. In addition, Sadler, Ethier, Gunn, Duong, and Woody (2009), showed that when interdependent shifts and oscillations were removed from interaction data, what remained (i.e., bursts) accounted for far less variance (i.e., 1-2%) compared to the other two phenomena.

Although the concepts of interdependent shifts and oscillations are somewhat similar to concepts examined in some previous work on relationship communications (e.g., Bernieri &

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Rosenthal, 1991; Capella, 1996; Condon & Ogston, 1971; Warner, 1988), they have not yet been applied to the study of the interpersonal dynamics of marital interactions.

Effects of Dysphoria on Interactions in Romantic Relationships

Dysphoria, which may include negative mood, lack of interest, fatigue, changes in appetite and sleep, indecisiveness, irritability, and thoughts of suicide (American Psychiatric Association, 2000), affects the ways in which romantic partners interact with one another. In general, individuals experiencing dysphoria tend to interact with their partners in an impoverished manner that is often unsatisfying for their spouses (Miller, Perlman, & Brehm, 2007).

A number of studies have examined the impact of dysphoria on verbal and nonverbal communication. In regards to the quality of verbal communication behaviours, studies have found that dysphoric individuals speak more slowly and more monotonously, have longer pauses in their speech patterns, are more self-focused, and take longer to respond to others' statements (e.g., Gotlib & Whiffen, 1991). When the content of speech is investigated, studies have shown that dysphoric feelings and negative self-evaluation often emerge in interactions of married couples with a depressed partner (e.g., Hautzinger, Linden, & Hoffman, 1982). In regards to the nonverbal communication behaviours, investigations have revealed that during social interactions, depressed individuals maintain less eye contact (e.g., Segrin, 1992; Youngren & Lewinsohn, 1980), smile less frequently (e.g., Segrin, 1992), engage in less head-nodding than others (e.g., Troisi & Moles, 1999), and are more likely to hold their head in a downward position (e.g., Ranelli & Miller, 1981). From the perspective of interpersonal theory, these various findings are consistent with depressed partners showing generally lower levels of affiliation and dominance.

Apart from examining the overall occurrence of particular verbal and nonverbal behaviours during marital interactions, a number of studies have investigated the specific ways in which dysphoria affects the natural give and take that occurs during marital interactions. For example, Johnson and Jacob (2000) examined depressive marital communication using a sequential analysis. These researchers used an abbreviated version of the Marital Interaction Coding System (MICS; Weiss, Hops, & Patterson, 1973), which is a widely used coding system for studying marital communication. The rating system contained 16 specific behaviour codes, and a number of additional combination codes, to describe participants' verbal and nonverbal behaviours. Codes were grouped as positive (denoting a positive evaluation of the speaker), negative (denoting a negative evaluation of the speaker), and problem-solving (denoting codes that added to the discussion and the resolution of the topic of discussion). For example, the positive group included "agree" and "humor", the negative group included "disagree" and "put down", and the problem-solving group included "question" and "solution." In order to detect sequential dependencies between these categories, the authors examined the probability of a specific response code given a specific immediately antecedent code assigned to one's partner. In examining sequential patterns, the results revealed that for both husbands and wives, a history of depression was associated with less positive exchange in marital interaction. That is, spouses with more frequent episodes of depression were less likely to follow their partners' positive communication (e.g., agreeing, using humour, smiling/laughing) with positive messages of their own. From the perspective of interpersonal theory, this finding is consistent with weaker correspondence on affiliation.

Taken together, research on the impact of dysphoria in romantic relationships indicates that marital interactions of couples in which one or both partners are experiencing dysphoria tend

to be more negative and less skilled than the interactions of couples in which partners are not dysphoric.

Possible Gender Differences in the Effects of Dysphoria

Most investigations have focused on examining the marital communication of couples with a dysphoric wife (e.g., Sayers, Kohn, Fresco, Bellack, & Sarwer, 2001), principally due to the higher incidence of dysphoria among women (e.g., Nolen-Hoeksema, 1987). Current statistics indicate that depressive episodes occur twice as often in women as in men (American Psychiatric Association, 2000). However, examining the impact that husband's dysphoria may have on marital communication is arguably equally important, because the couple is an interdependent unit in which the behaviours of one partner influence the behaviours of the other, and vice versa.

Also, there is reason to believe that the marital communication patterns of couples with a dysphoric wife may be different from the patterns of couples with a dysphoric husband (Rehman, Gollan, & Mortimer, 2008). First, some evidence indicates that women tend to be more emotionally expressive (Flaherty & Richman, 1989) and are more likely to report higher levels of both positive and negative emotions (e.g., Fujita, Diener, & Sandvik, 1991). Second, other investigations have found that women more often show signs of dysphoria and seek assistance for even mild levels (Hammen & Padesky, 1977). Third, research suggests that women may be more relationship-oriented and may have a greater responsibility for the marital relationship (Nolen-Hoeksema & Girgus, 1994). As such, high dysphoria in women is often hypothesized to have a larger impact on marital communication and the romantic relationship in general than high dysphoria in men (e.g., Rehman et al., 2008; Whisman, 2001).

Although most research has focused on solely examining the impact of wives' dysphoria on marital communication, a few studies have reported results for both spouses. For instance, Johnson and Jacob (1997) explored gender differences in conflictual marital interactions of 50 couples with a depressed husband, 41 couples with a depressed wife, and 50 couples with no depression. The authors found that wives' depression was associated with greater disruptions in couples' communication, as compared to the depression of husbands. That is, couples with a depressed wife displayed less positive communication (such as agreement and approval) than couples with a depressed husband, even though depression severity was higher for the husbands in the sample.

In contrast to the findings of Johnson and Jacob (1997), Schudlich, Papp, and Cummings (2004) evaluated the conflict marital interactions of 267 couples and found that husbands' dysphoria was associated with greater disruptions in couples' communication, as compared to the dysphoria of wives. Specifically, the results showed that greater dysphoria among husbands was significantly related to the use of negative conflict strategies and emotions (e.g., insults, verbal hostility, negative affect, withdrawal), as well as the absence of more constructive strategies (e.g., calm discussion). This result emerged even though dysphoria levels were higher for the wives in this sample.

Finally, Johnson and Jacob (2000) examined the sequential patterns of communication in conflictual marital interactions of 41 couples with a depressed wife, 49 couples with a depressed husband, and 50 couples without a depressed partner. They found that there were generally no sequential patterns that discriminated couples with a depressed wife from couples with a depressed husband. However, the study did find an interesting effect: when depressed husbands

exhibited positive communication behaviours, their wives displayed decreased positivity and increased negativity (e.g., disagreeing, criticizing, putting down).

Given these mixed findings, further research is needed to elucidate differences in the impact wives' and husbands' dysphoria may have on marital communication. In addition, some previous findings (e.g., Johnson & Jacob, 2000) suggest that further examination of the dynamics during marital interactions would be promising.

<div align="center">Joystick-based Continuous Assessment Technique</div>

In order to study the impact of dysphoria on interaction dynamics, a method for capturing the continuous flow of intimates' interpersonal behaviour during a marital interaction is essential.

One study that made a continuous assessment of behaviour had couples use a rating dial to capture their continuous perceptions of their own affect and the affect of their spouse on a continuum from very negative to very positive (Hawkins, Carrere, & Gottman, 2002). However, only one dimension may be assessed with a dial, and because interpersonal theory specifies two dimensions as being important, an alternate method needs to be employed to continually rate both dominance and affiliation.

Meeting this challenge is a new technique for rating behaviour using a joystick-based program that allows observers to assess the moment-to-moment interpersonal behaviour simultaneously on two dimensions during an interaction (Lizdek, Sadler, Woody, Ethier, & Malet, 2012). This computer-based assessment involves watching a video of an interaction and rating one target person's moment-to-moment behaviour using a joystick. A second viewing of the video is needed to provide comparable moment-to-moment ratings of behaviour of the partner.

A study conducted by Sadler et al. (2009) used this approach to make observations of moment-to-moment levels of dominance and affiliation for 50 previously unacquainted male-female dyads. Using the joystick, four independent observers recorded continuous streams of behaviour for each participant, which were then averaged at every time point to obtain an aggregated time series. The data analyses revealed strong evidence for interdependent shifts in directions that are consistent with interpersonal complementarity. In addition, analyses showed very strong evidence for the presence of interdependent oscillations, also with patterns in line with interpersonal complementarity. However, there were substantial differences between dyads in these tendencies, suggesting that people vary in their interaction dynamics, such as their capacity to develop and maintain entrained patterns.

Another study by Markey, Lowmaster, and Eichler (2010) used the joystick-based continuous assessment technique to examine the real-time behavioural exchanges of 33 unacquainted female-female dyads during a 12-minute unstructured lab interaction. The authors hypothesized that during the interaction, members of dyads would coordinate their interpersonal behaviours in a complementary fashion. The study's results showed this pattern; that is, the moment to moment variations in partners' dominance were inversely related whereas the moment to moment variations in partners' affiliation were directly related. This study also revealed that complementarity matters: partners who became similar on the affiliation dimension tended to like each other more and completed tasks more quickly and accurately than partners who were not as complementary on this dimension.

The joystick-based continuous assessment technique has been used in other areas of research as well. For example, recently Tracey, Bludworth, and Glidden-Tracey (2011) have employed the joystick to study processes that occur in psychotherapy between the client,

therapist, and supervisor. Thomas, Hopwood, Ethier, and Sadler (2012) have also recently used the joystick to study psychotherapy processes.

Aims of the Present Study

The current research extends the work of an earlier study conducted by Rehman, Ginting, Karimiha, and Goodnight (2010), in which the authors focused on the effect of wives' dysphoria on marital interactions. Couples, in which wives and husbands varied in dysphoria levels, came into the lab and engaged in two marital conflict discussions, one preceded by a sad mood induction for the wife, and the other with no mood induction. To characterize the observed interaction behaviours, raters used the Conflict Rating System (CRS: Christensen & Heavey, 1990), coding "negative demands" (e.g., demands stated in a hostile, domineering, defensive tone of voice) and "positive demands" (e.g., demands stated with warmth, humour, understanding). The results indicated that the wife's dysphoria only had an effect on these interaction behaviours when she had just received a mood induction: After a mood induction, greater wife's dysphoria was related to her own greater engagement in negative demands and her husband's greater engagement in positive demands. The authors interpreted these results as suggesting that dysphoria in wives may only affect marital interactions when she is in a low mood.

This present study re-examines the same videotaped marital interactions used in Rehman et al. (2010) and extends the earlier work in two important ways. First, the current study codes the interactions in a very different way, using the joystick technique to assess moment-to-moment fluctuations in each partner's levels of dominance and affiliation. This procedure allows us to characterize the dynamic nature of the partners' behaviours, as they unfold over time, in contrast to the relatively static coding used in the earlier study, which was based on the

proportion of time, aggregated across the entire interaction, that each partner engaged in a specific behaviour. Second, instead of focusing solely on wife's dysphoria, the present study broadens the earlier work by investigating the impact of both wife's and husband's levels of dysphoria on marital communication.

In summary, the main goal of the present study was to examine the impact that romantic partners' dysphoria may have on the interpersonal dynamics (across-time patterns) of their interactions about conflictual issues. In addition, we devoted particular attention to the possibility of important gender differences in the effects of dysphoria. In accordance with interpersonal theory, the interpersonal phenomena investigated were dominance and affiliation, and the joystick assessment technique was used to track the moment-to-moment variations in each partner's levels of these two dimensions over the course of each interaction. For both dominance and affiliation, we measured two major types of interaction dynamics:

1. Each partner's linear change over the duration of the interaction. This allowed us to investigate how dysphoria may affect shifts in each partner toward greater dominance, or alternatively, toward greater submissiveness, and toward greater affiliation or, alternatively, greater hostility.

2. The degree of entrainment between partners during the interaction. This allowed us to investigate how dysphoria may affect the tendency for partners to be "in tune" with each other—that is, to interlink or synchronize their variations in dominance and in affiliation.

Method

Participants

The sample investigated in the present study consisted of 60 heterosexual couples recruited from a mid-sized city in Ontario, Canada. Participants were recruited through fliers at local businesses, social services agencies and hospitals, and letters to local mental health providers. All participants met the following eligibility criteria: (a) couples had to be married or cohabiting, (b) both partners had to be willing to participate, and (c) both partners had to be able to read and write in English. The husband and wife did not need to be clinically depressed in order to take part in the study. However, a phone screening interview of the wife, based on items from the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; First, Spitzer, Gibbon, & Williams, 1995), was used to check exclusionary criteria. Couples were excluded if the wife appeared to meet the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) criteria for any of the following: (1) bipolar disorder (past or present); (2) diagnosed schizophrenia, schizophreniform disorder or paranoid disorder; (3) organic brain syndrome; (4) intellectual disability; (5) substance abuse disorder (current or within the past 6 months); (6) anorexia or bulimia; or if the wife was (7) at imminent suicide risk; or (8) currently receiving psychotherapy. These exclusionary criteria were intended to be consistent with previous research on depression and to protect the well-being of the participant.

Although the original sample consisted of 71 couples, we excluded eleven couples from the present study because limitations of the video recordings collected on these pairs made them not codable using the present methods. Specifically, three of the couples' video interactions were too short in duration to allow us to examine the cyclical nature of participants' behaviour. In three other videos, a participant was off screen for an extended period of time (i.e., 30 seconds or

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more), which prevented accurate ratings during these times. Another three videos had poor audio quality and could not be heard well by raters. Finally, two couples were excluded because a partner in each dyad had a physical disability that significantly interfered with coding (e.g., use of an oxygen mask).

The mean age of participants was 33.16 (*SD* = 11.57) for women and 36.22 (*SD* = 12.22) for men. Wives had completed 14.95 years (*SD* = 2.62) of schooling and husbands had completed 14.23 years (*SD* = 3.33) of education on average. In terms of ethnic identity, 83.3% of wives and 88.3% of husbands self-identified as Caucasian. One wife (1.7%) self-identified as African, one as Hispanic, one as Asian or Pacific Islander, one as First Nation, and three women (3%) endorsed the "Other" category. One husband self-identified as African, one as Hispanic, one as Asian or Pacific Islander, one as First Nation, and one endorsed the "Other" category. Couples in our sample had been together for an average of 9.81 years (*SD* = 9.77).

Procedure

The data for the present study were obtained as part of a larger project examining depression and relationship functioning (Rehman et al., 2010). Participants who expressed an interest in the study were initially given a phone screening interview to determine whether they were eligible for participation. Following this, all assessments were conducted in the research laboratory. Trained assistants provided each couple with a brief introduction to the study, which was described as examining depression and relationship functioning, and obtained informed consent. Then the assistants conveyed husbands and wives to separate rooms, in which each filled out self-report questionnaires, including the Desired Changes Questionnaire (DCQ; Heavey, Layne, & Christensen, 1993). Subsequently, partners were brought together into the same room, where they were asked to engage in two eight-minute marital problem-solving

discussions, which were videotaped. Each discussion focused on finding a solution to an area of desired change in the relationship, one based mainly on the wife's responses to the DCQ and the other based mainly on the husband's responses. Partners sat in chairs directly facing each other. Two cameras in the room video- and audio-recorded both spouses, one camera capturing the face and upper body of the wife and the other capturing the face and upper body of the husband.

Immediately before partners engaged in one of the discussions, all wives were given a sad mood induction.[3] The order of mood induction (present vs. absent) was counterbalanced, as was the order of the two discussion topics.

In order to induce sad mood, each female participant was asked to identify a sad time in her life and write it on a piece of paper. Afterward, she was asked to think about that time as she listened to sad music. The music was, "Russia under the Mongolian Yoke" (1934) by Prokofiev from the Alexander Nevsky Cantata, played at half speed. Wives were asked to rate their mood on a visual analogue scale both before and after the mood induction. The mood induction occurred in a separate room and the husbands were not informed that their wives would be receiving a mood induction prior to one of the marital problem-solving discussions.

Apart from the measures and procedures described above, participants were also asked to complete additional measures which are not relevant to the current project. The entire study took 3.5 to 4 hours to complete. At the end, couples were fully debriefed, given the opportunity to ask questions, thanked for their participation, and paid $60.00.

Measures

The Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996). The 21-item BDI-II assesses severity of depressive symptoms. The BDI-II has demonstrated high internal consistency, test-retest reliability, construct validity, and factorial validity (e.g., Beck, Steer,

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Ball, & Ranieri, 1996). Cronbach's alpha for the BDI-II in the current sample was .95 for wives and .93 for husbands.

Desired Changes Questionnaire (DCQ; Heavey, Layne, & Christensen, 1993). The DCQ is a widely used 20-item instrument designed to help partners decide which topics they would like to discuss during the marital discussions. Items are rated on a 7-point Likert scale ranging from 1 ("no change") to 7 ("much more change"). Each participant was asked to rate how much he or she would like his or her partner to change in 20 areas (e.g., "Be more affectionate with me", "Participate in decisions about spending money", "Treat my relatives with greater respect"), and in three additional self-generated areas. After participants completed the DCQ, they were asked to rank order the three most important issues from which the research assistants chose the topics of discussion. In order to be certain that there were no major discrepancies in the desire for change across wife and husband topic, research assistants chose topics for which partners' ratings differed by no more than two points.

Coding of Marital Interactions

Computer Joystick Apparatus. A computer joystick apparatus (Lizdek et al., 2012) was used so that independent observers could provide moment-to-moment assessments of each participant's behaviour while they watched each marital problem-solving discussion. The joystick apparatus included a Microsoft Sidewinder Force Feedback 2 joystick that was connected to a personal computer running the Windows XP operating system. A joystick monitor software program captured the moment-to-moment assessment of each participant's behaviour. The software program displays a Cartesian plane that is approximately 6.8 cm wide and 6.6 cm tall in the lower right corner of the computer screen (see Figure 2). To depict the axes of interpersonal theory, the X-axis endpoints are labeled friendly (right) and unfriendly (left) and

Figure 2. Joystick monitoring program interface displaying the interpersonal Cartesian plane

during data collection.
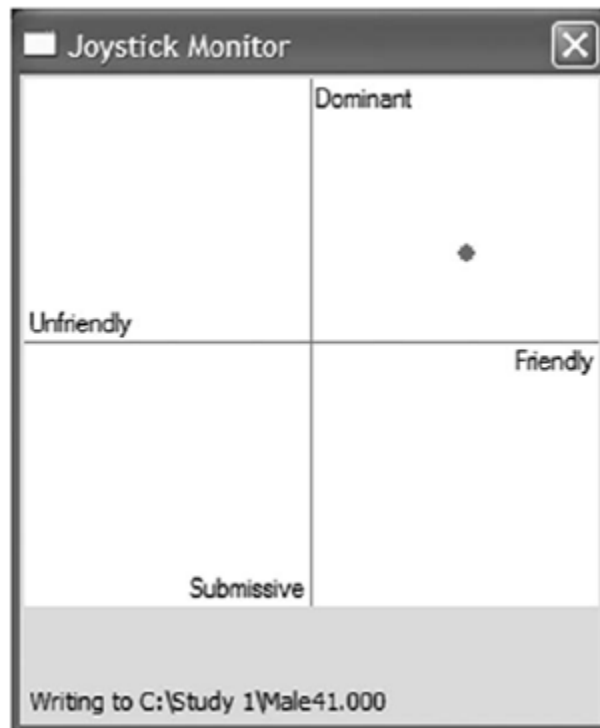
Note. The dot shows the current position of the joystick.

the Y-axis endpoints as dominant (top) and submissive (bottom). The scale on both axes ranges from -1000 to 1000, such that 1000 on the X-axis indicates extreme friendliness, and 1000 on the Y-axis indicates extreme dominance. A dot on the screen indicates the (x, y) position of the joystick within the Cartesian plane. Twice per second this position is saved as a bivariate data point in a comma-delimited file. The resulting data set consists of two time series of the ratings, one for dominance and one for affiliation (i.e., a continuous stream of ratings for each participant).

In addition to the interpersonal plane and the dot showing the current rating, which were always visible in the lower right corner of the computer screen, the video of the interaction being rated simultaneously appeared on the screen, so that an observer could watch the target person's behaviour in the interaction and continuously rate it. Each videotaped interaction was played in a VLC Media Player window that was approximately 23 cm wide by 16 cm tall. The joystick provided "force feedback," exerting more pressure against the observer's hand as he or she moved the joystick further away from the origin, thus providing the observer with a further, tactile cue about their current rating.

Training of Observers. For the present study, three independent observers (two females and one male) were trained to use the joystick apparatus to make continuous assessments of behaviour. Each coder was trained in four sessions of approximately two hours each on how to properly operate the joystick apparatus, using well-established procedures (Lizdek et al., 2012).

First, observers were shown how the computer joystick functions and were then given time to practice moving the joystick's hand grip to simultaneously rate dominance and affiliation. To be sure observers understood how to accurately code both dimensions of behaviour, they were instructed to move the joystick to the correct location in the Cartesian plane

in response to 16 interpersonal adjectives. (e.g., assertive, sly, trusting, cold). Any incorrect responses were discussed and the process was repeated until all words were located correctly within the Cartesian plane.

Next, each observer used the joystick to code moment-to-moment behaviour of eight participants from an earlier study. These eight participants were from four 10-minute video segments of opposite-sex unacquainted dyadic interactions. Observers watched every video twice, each time coding a different participant. During the coding, the trainer monitored each observer's performance, and after each segment, any problems or questions were discussed. In addition, plots were generated by the trainer to compare each observer's affiliation and dominance ratings with an averaged time series from the observers of the original study. The plots facilitated the detection of any specific errors the trainees were making. Throughout the training, the trainer emphasized the need for the joystick ratings to be based on behavioural changes in the target person from moment to moment, instead of merely reflecting the observers' general sense of how the interaction was developing.

Procedure for Observer Ratings. The observer started playback of the video of the interaction to be rated and began coding the interpersonal behaviour of a participant by pressing the start button on the joystick apparatus at exactly 5 seconds into the interaction. (The five-second start time was chosen because it allotted observers adequate time to focus their attention on the task and calibrate the timing.) By moving the joystick appropriately for the next 7 minutes and 55 seconds, the observer created a continuous rating of each participant's moment-to-moment levels of dominance and affiliation.

Each observer assessed the moment-to-moment interpersonal behaviour of each participant from each couple in each of their two interactions. Thus, in total, every observer

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made 480 (i.e., 60 couples x 2 partners x 2 interactions x 2 dimensions of behaviour) assessments of behaviour. To avoid assessing partners from the same couple consecutively, observers rated the behaviour of only one partner from each couple before moving on to another video clip from another couple. In addition, observers rated a partner of a different gender from one interaction to the next and also alternated between rating interactions in which the topic of discussion came from the wife versus the husband. The order in which participants were rated was also varied across the observers.

To avoid the possibility of 'boxcar' effects (Warner, 1998) that may occur at the beginning of the series (when the observer is rapidly moving the joystick from its resting position to the position indicating the first true assessment of the target person's behaviour), the first five seconds (10 data points) was omitted from every time series prior to data analysis. Thus, the final time series each had a duration of 469 seconds (474 – 5 seconds), or 938 data points (469 seconds multiplied by 2 samples per second).

Inter-rater reliability and aggregation of time series across raters. It is important to assess whether the observers are triangulating reasonably in their moment-to-moment ratings. To examine reliability at the moment-to-moment level in each time series, we calculated the proportion of the shared variance to the total variance (Sadler et al., 2009). The shared variance was estimated as the mean of covariances computed across every pair of observers, and the total variance was the variance of the scores obtained by averaging across the three observers at each time point. The resulting values were reasonably good; Table 1 shows the means across the 60 wives and the 60 husbands for the two interactions. Clearly, whether the wife had received a sad mood induction or not made no difference in terms of the reliabilities. These values are comparable to those obtained by Sadler et al. (2009), who found the means for female's and

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Table 1

Reliability of Moment-to-Moment Variations in Individual Time Series

	Interaction with No Induction		Interaction after Mood Induction	
	Wife	Husband	Wife	Husband
Dominance	.83	.85	.83	.85
Affiliation	.70	.64	.69	.63

male's dominance to be .67 and .68, respectively, and the means for female's and male's affiliation to be .65 and .60, respectively.

Subsequently, for each time series the individual moment-to-moment ratings of the three observers were aggregated by computing the mean at each time point. These averaged time series provide a consensus about moment-to-moment changes in behaviour that attenuates idiosyncratic perceptions in any one observer. Once the averaged time series were computed, the data for each individual in each marital discussion consisted of two time series: one for a participant's levels of affiliation over time, and another for the participant's levels of dominance over time.

Calculation of Indices of Interaction Dynamics

Interdependent shifts. To examine overall linear trends for each univariate time series, regression analyses were conducted predicting dominance and affiliation for each of the two discussions, always using time as the predictor. From these analyses, the *intercept* and *overall change* were derived for each participant over the 469-second period. Whereas the intercept indexes the level at the very beginning of the interaction, the overall change indexes the linear change over the period.

Interdependent oscillations. The linear trend was removed from the data for each univariate time series by outputting the residuals from the foregoing regression analyses. Using these detrended data, the degree of entrainment was assessed by submitting each bivariate time series (e.g., the husband's moment-to-moment affiliation and the wife's moment-to-moment affiliation) to cross-spectral analyses (Warner, 1998). Cross-spectral analysis can be used to derive indices of the extent of entrainment or synchrony between partners in their behavioural cycles (Sadler et al., 2009), as detailed below.

The 469-second period and the 0.5-second frequency of behavioural sampling establish the set of orthogonal frequencies into which the spectral analyses divide the series. There are 938 / 2 = 469 such frequencies. Although the number of frequencies is relatively high, most of them are in all likelihood too high to be of much value for capturing behaviours of interest in the current study. As such, the lowest frequencies are much more important. Regarded as the length of a cycle, the lowest frequencies are 469.0 s (7.8 min), 235.0 (3.9 min), 156.3 s (2.6 min), 117.3 s (2 min), 93.8 s (1.6 min), 78.2 s (1.3 min), 67.0 s (1.1 min), 58.6 s (1.0 min), 52.1 s, 46.9 s, 42.6 s, 39.1 s, 36.1 s, 33.5 s, 31.3 s, 29.3 s, 27.6 s, 26.1 s, and 24.7 s. Thus, these lowest frequencies are the actual lengths of a full sine wave that the partners may be cycling on during their interactions.

Cross-spectral analyses were performed separately on each couple in each of their two interactions and then the individual statistics were combined into a summary data file. To index the degree of coordination of behavioural cycles between partners, the *average weighted coherence* was computed, which indexes the extent of rhythmic entrainment between partners. The coherence is a correlation-squared-like statistic that indexes how closely related the partners' variations in amplitude are at each frequency. In computing the average of these values across the frequencies specified above, the coherence at each frequency was weighted by the proportions of variance for each partner at this particular frequency (Sadler et al., 2009). The average weighted coherence values range from 0 to 1, and tell us how strongly entrained partners are, with higher values indicating greater entrainment.

As a supplemental index of interdependent oscillations, we also used the detrended data to compute the *cross-correlation* between partners (e.g., the moment-to-moment correlation between the husband's affiliation level and the wife's affiliation level). In previous work, this

index has proven to be very highly related to the average weighted coherence (e.g., Sadler et al., 2009, found $r = .79$ for affiliation and $r = -.82$ for dominance). However, an advantage of the cross-correlation is that it indicates the sign of the relation between partners, which, according to interpersonal theory, would be expected to be positive for affiliation, but negative for dominance. Because the average weighted coherence is a correlation-squared-like statistic, it does not retain this information. However, the average weighted coherence is a purer measure of rhythmic entrainment, because, unlike the cross-correlation, it does not include the effect of interdependent bursts (patterns of relation that have no regular structure across time).

Results

The Nature of Differences between Couples in Interaction Dynamics

Rehman et al. (2010) found that whether the marital interaction was based on the husband's or the wife's responses to the DCQ had no important effects on the interaction variables investigated in that study. Preliminary analysis of our indices of interaction dynamics likewise indicated that topic was not an important determinant of the results, and so it was not pursued further in the data analyses.

However, as reviewed earlier, Rehman et al. (2010) found that whether or not the wife received a mood induction prior to a marital interaction moderated the effects of her dysphoria on the interaction variables investigated in that study. Therefore, in the present study, throughout the data analyses we looked for any possible main effects or moderating effects that the mood induction might have on our indices of interaction dynamics.

Initially, we wanted to establish that the indices of interaction dynamics used here were tapping a meaningful range of differences between couples. Table 2 provides descriptive statistics for the *intercept* and *overall change* for dominance and affiliation for husbands and wives. In addition, these statistics are presented separately for each interaction, the one with no mood induction versus the one after a mood induction. In general, the standard deviations and the ranges demonstrate that there was a great deal of variation in these values between different couples. In particular, the slopes indicate that partners, rather than steadily expressing an interaction style that stayed the same over the course of the interaction, were tending to shift in their dominance and affiliation levels as the interaction unfolded. As the table shows, the mood induction had no significant effect on any of these indices.

Table 2

Summary Statistics for Intercepts and Overall Change

Dependent Variable	Interaction with No Induction			Interaction after Mood Induction			*t*-test of Difference in Means
	Mean	SD	Range	Mean	SD	Range	
Intercept of Dominance							
Wives	140.99	260.21	−516.52 to 618.94	135.30	304.04	−717.58 to 585.82	0.18
Husbands	88.68	252.81	−533.42 to 660.94	111.91	287.66	−580.55 to 740.15	−0.63
Intercept of Affiliation							
Wives	147.36	150.02	−260.75 to 385.87	130.88	164.43	−392.43 to 467.86	1.04
Husbands	129.81	125.71	−171.71 to 422.26	132.12	135.37	−154.54 to 447.91	0.09
Overall Change of Dominance							
Wives	68.93	767.66	−1874.00 to 2098.88	52.32	753.71	−1508.57 to 2679.82	0.09
Husbands	−121.49	651.73	−1695.97 to 1433.61	−83.55	744.27	−2398.72 to 1574.16	−0.23
Overall Change of Affiliation							
Wives	−88.78	318.03	−1086.92 to 524.72	−8.43	358.88	−1199.36 to 1161.88	−1.50
Husbands	−17.95	275.60	−1068.18 to 402.91	−29.67	251.71	−599.68 to 721.49	0.06

Note. Overall change is the linear slope over the entire interaction.

For all *t*-tests, *df* = 58; critical value of *t* for *p* < .05 is |2.01|.

The principle of interpersonal complementarity leads to the prediction that partners' initial levels of dominance should be negatively correlated, as should their respective changes in dominance over the course of the interaction. The data strongly showed both of these patterns: for the interactions without and with a mood induction, respectively, the correlation of wives' and husbands' intercepts was −.53 and −.60, and the correlation of their overall changes was −.69 and −.76 (for all, $p < .01$). In contrast, the principle of interpersonal complementarity leads to the prediction that partners' initial levels of affiliation should be positively correlated, as should their respective changes in affiliation over the course of the interaction. The data also strongly showed both of these patterns: for the interactions without and with a mood induction, respectively, the correlation of wives' and husbands' intercepts was .60 and .52, and the correlation of their overall changes was .39 and .55 (for all, $p < .01$). These results indicate that interdependent shifts were occurring over the course of the interactions, and that the joint patterns between partners were consistent with the hypotheses of interpersonal theory.

Table 3 provides descriptive statistics for the indices of interdependent oscillations—namely, the *cross-correlation* and *average weighted coherence* for dominance and affiliation. As before, these statistics are presented separately for each interaction. Again, the standard deviations and the ranges demonstrate that there is a great deal of variation in these values between different couples. As noted earlier, the different sign for the cross-correlation and average weighted coherence for dominance is due to the fact that coherence is a correlation-squared-like index that is unsigned. Table 3 shows that, as with the previous indices, the mood induction had no discernible effect on these indices.

Table 3

Summary Statistics for Cross-Correlations and Average Weighted Coherence

| Dependent Variable	Interaction with No Induction			Interaction after Mood Induction			*t*-test of Difference in Means
	Mean	SD	Range	Mean	SD	Range	
Cross-Correlation:							
Dominance	−.58	.23	−.91 to .05	−.56	.24	−.94 to .12	−0.67
Affiliation	.39	.19	−.01 to .69	.36	.22	−.13 to .81	0.82
Average Weighted Coherence:							
Dominance	.56	.24	.09 to .96	.55	.24	.08 to .97	0.22
Affiliation	.37	.17	.10 to .69	.36	.19	.08 to .81	0.44

Note. For all *t*-tests, $df = 58$; critical value of *t* for $p < .05$ is $|2.01|$.

The principle of interpersonal complementarity leads to the prediction that wives' and husbands' moment-to-moment changes in dominance should be negatively related, whereas their moment-to-moment changes in affiliation should be positively related. As Table 3 shows, the data strongly supported both of these predictions: The mean cross-correlation for dominance was significantly less than zero [$t(58) = -19.00$, $p < .001$, for the interaction without an induction, and $t(59) = -18.35$, $p < .001$, for the interaction after an induction], and the mean cross-correlation for affiliation was significantly greater than zero [$t(58) = 15.52$, $p < .001$, for the interaction without an induction, and $t(59) = 12.55$, $p < .001$, for the interaction after an induction]. Moreover, out of the 120 interactions, 117 yielded a negative cross-correlation for dominance and 114 yielded a positive cross-correlation for affiliation. In summary, although the extent of interdependent oscillations varies considerably between couples, the overall patterns closely conform to the hypotheses derived from interpersonal theory. In addition, as with the intercepts and slopes, the fact that mood induction did not affect the cross-correlations and average weighted coherences suggests that what these indices measure is not simply a reflection of current mood.

Finally, Figures 3 and 4 concretely illustrate the qualities in the bivariate time series that are captured by the indices of interdependent oscillations. Figure 3 shows the moment-to-moment levels of dominance for two particular couples, one couple with high entrainment (large absolute values for the cross-correlation and the average weighted coherence) versus another couple with low entrainment (small values for these two indices). Figure 4 presents examples of the corresponding contrast in the patterns of moment-to-moment levels of affiliation. The two figures show how higher entrainment indexes more closely coordinated, recurrent variations between partners.

Figure 3. Examples of bivariate time series illustrating high and low levels of entrainment on dominance between partners.

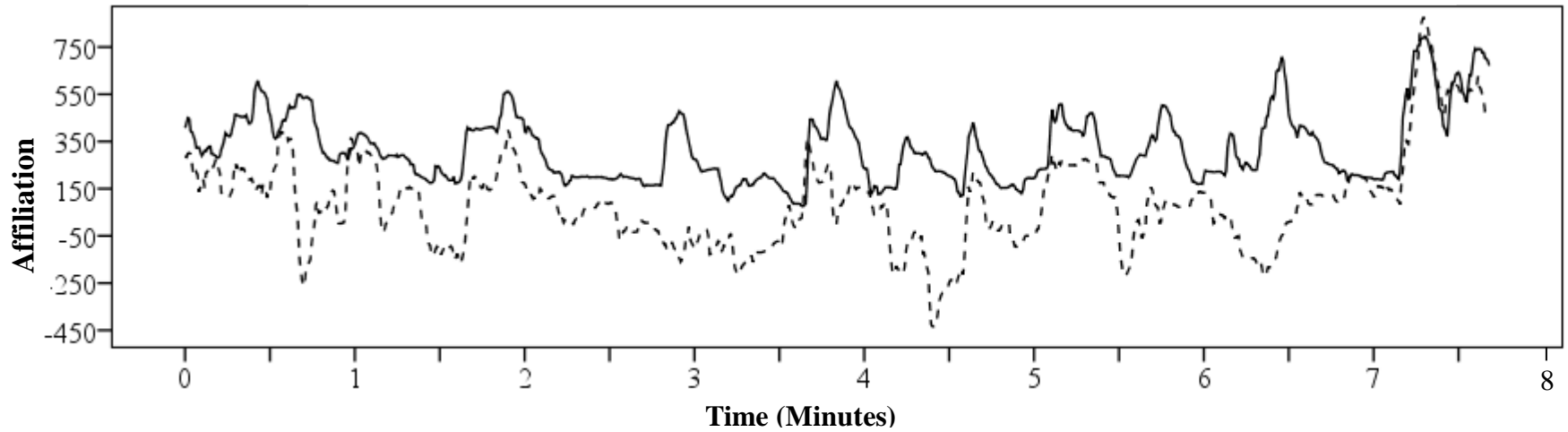High entrainment: cross-correlation = -.88, average weighted coherence = .96
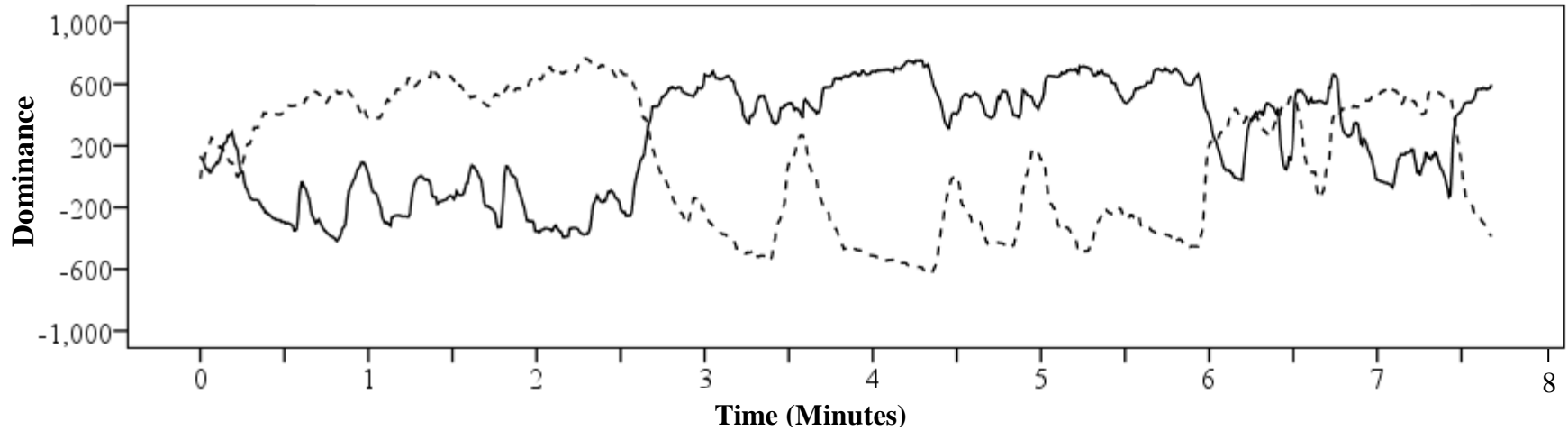
Low entrainment: cross-correlation = -.11, average weighted coherence = .08
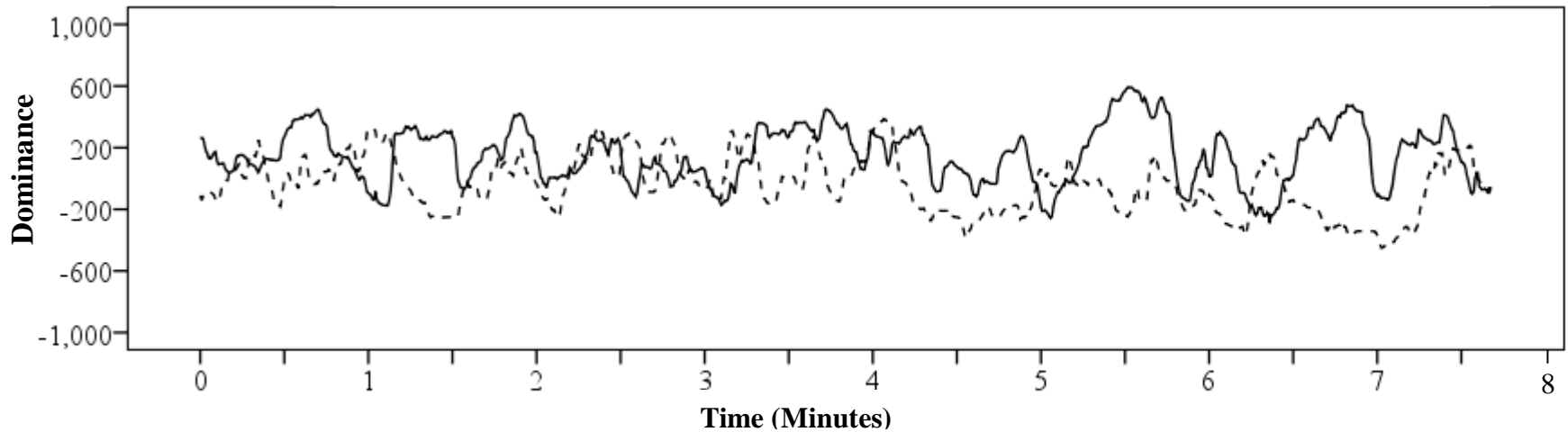
Note. Solid line is the wife's dominance, and the dotted line is the husband's dominance.

Figure 4. Examples of bivariate time series illustrating high and low levels of entrainment on affiliation between partners.

High entrainment: cross-correlation = .49, average weighted coherence = .60

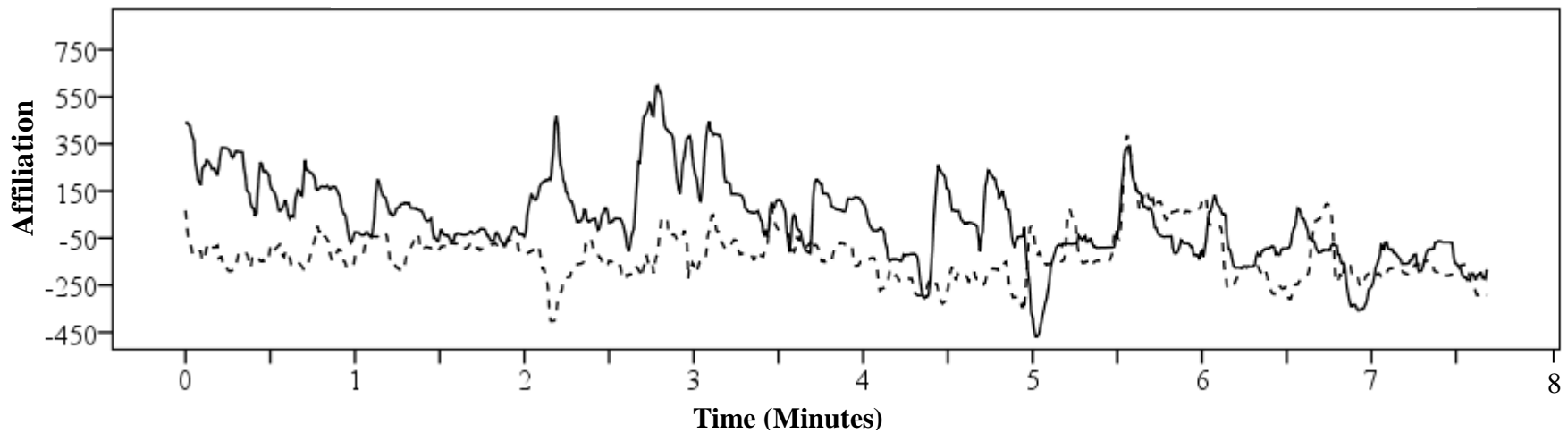Low entrainment: cross-correlation = .17, average weighted coherence = .10

Note. Solid line is the wife's affiliation, and the dotted line is the husband's affiliation.

Effects of Dysphoria on Overall Changes and Coherence

To examine the effects of partners' levels of dysphoria on their interaction dynamics, we focused on six interaction-dynamics variables, measured for each of the two eight-minute marital problem-solving interactions: wife's and husband's overall change in dominance, wife's and husband's overall change in affiliation, average weighted coherence for dominance, and average weighted coherence for affiliation. We did not include intercepts in these analyses because they are not a dynamic variable (i.e., they do not index anything about patterns across time); however, we did use the appropriate values of the intercepts in the graphs showing the effects of dysphoria on the slopes (i.e., Figures 6 and 8). In addition, we did not use the cross-correlation as an additional index of entrainment because, as mentioned earlier, it is very strongly correlated with the average weighted coherence, and the latter is a purer index of interdependent oscillations (Sadler et al., 2009; Warner, 1998).

The main structural equation model used to analyze each of the six interaction-dynamics variables is shown in Figure 5, using wife's change in dominance as an example. This model treats the two interactions (no induction vs. mood induction) as multiple measures of a latent variable of wife's change in dominance. In other words, the model attempts to generalize across the two occasions of measurement. The measurement paths from the latent variable to the two measurements are set to one simply to constrain units of measurement for the two occasions to be the same. Path coefficient *a* represents the effect of wife's dysphoria, and path coefficient *b* represents the effect of husband's dysphoria.

Note that this model constrains the effect of each predictor variable to be the same for both interactions. That is, the effect of wife's dysphoria on the no induction condition and the mood condition are both equal to *a*, and the effect of husband's dysphoria on the two conditions are both equal to *b*. The fit of the model tests these constraints. In other words, if the model does

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Figure 5. Structural equation model relating wife's and husband's dysphoria to wife's change in dominance.
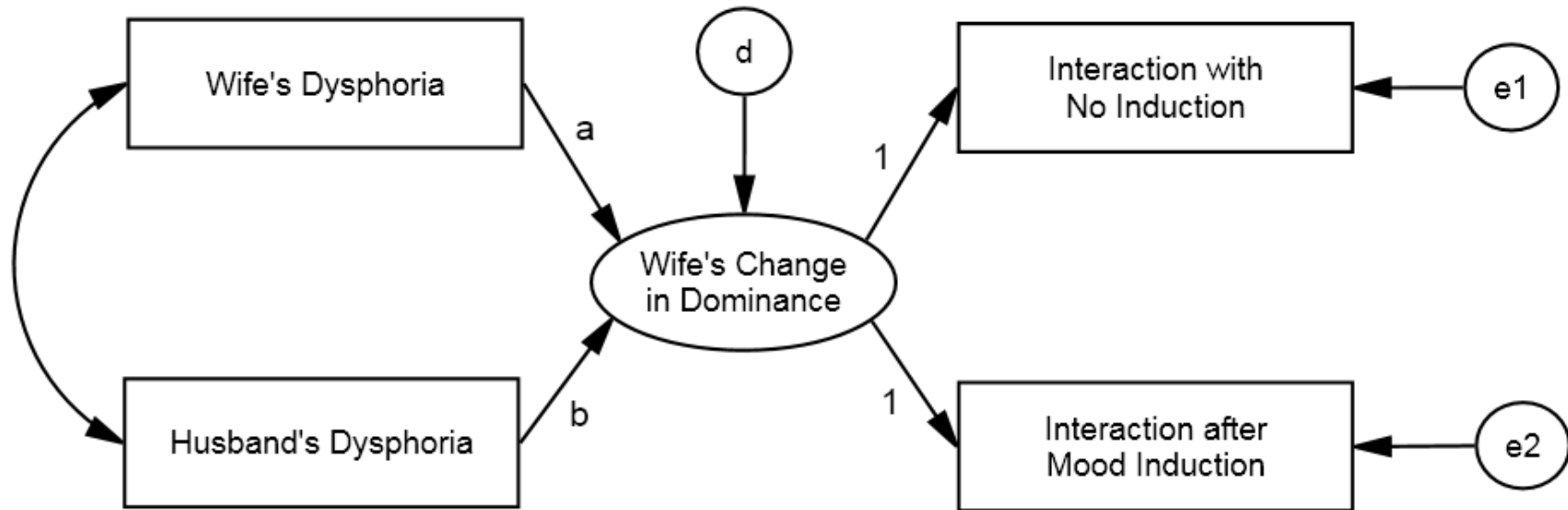
Note. a = effect of wife's dysphoria on wife's change in dominance; *b* = effect of husband's dysphoria on wife's change in dominance.

The paths set equal to 1 simply constrain the units of measurement for the two interactions to be the same

not fit well for a particular interaction-dynamics variable, the implication is that the results differ significantly depending on whether there was a prior mood induction or not. On the other hand, if the model fits well, a major advantage of it is that we can generalize the obtained results across the two marital interactions.

Table 4 presents the results for each of the six interaction-dynamics variables.[4] Note (at the right) that the fit of the model was excellent for five of the variables, as indicated by a low χ^2 and non-significant p-value (showing no significant lack of fit). The lack of fit for the remaining variable, change in husband's affiliation, was statistically significant, suggesting that we should examine separate effects for each interaction, as we address in a moment.

For both wife's and husband's change in dominance, there were very strong relations with the wife's level of dysphoria, but there were no such relationships with the husband's level of dysphoria. Furthermore, wife's dysphoria had strongly opposite effects on the two partners' dominance behaviour over the course of the interaction: More dysphoric wives increased more in dominance over the interactions and their husbands decreased in dominance. As Table 4 indicates, these gender differences in the effect of dysphoria were statistically significant. In contrast, for both wife's and husband's change in affiliation, there was a very strong negative relation with the husband's level of dysphoria, but no such relation with the wife's level of dysphoria. Although these gender differences in the effects of dysphoria are both large and similar in magnitude, the one for husband's change in affiliation is statistically significant, whereas the one for wife's change in affiliation only reaches a marginal level of statistical significance. Finally, for the couple's average weighted coherence for affiliation, there was a very strong negative relation with the husband's level of dysphoria. In summary, the results

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Table 4

Results of SEM Analyses Relating Wife's and Husband's Dysphoria to Interaction Dynamics

Dependent Variable	Beta for Wife's Dysphoria	Beta for Husband's Dysphoria	χ^2 of Difference in Betas	% of Variance Explained	Fit of Model χ^2	*p*
Change in Dominance:						
Wife	.60**	−.13	6.09*	38%	0.73	.69
Husband	−.55*	.17	4.82*	32%	1.69	.43
Change in Affiliation:						
Wife	−.04	−.72*	2.76[†]	52%	3.33	.19
Husband	−.03	−.80**	5.68*	64%	14.07	< .01
Coherence for Dominance	−.12	.19	2.15	5%	0.47	.79
Coherence for Affiliation	−.14	−.58*	1.93	36%	0.26	.88

Note. [†]$p < .10$; *$p < .05$; **$p < .01$.

The χ^2 tests of the difference in betas compare the unstandardized coefficients and have $df = 1$.

For all models, the fit of the model (shown in the last column) has $N = 60$ and $df = 2$.

suggest that the effects of wife's versus husband's dysphoria on interaction dynamics are quite distinct.

Figure 6 illustrates the significant effects of wife's dysphoria on the overall change in husband's and wife's dominance over the course of an interaction, using the results in the no-induction interaction as an example.[5] As shown in the upper panel, when the wife was not dysphoric, the wife's and husband's levels of dominance tended to stay roughly the same over the course of the interaction. In contrast, in the lower panel, when the wife was dysphoric, the wife's and husband's levels of dominance sharply diverged over the course of the interaction, with the wife becoming steadily more dominant and the husband steadily more submissive.

For the interaction-dynamics variable that showed some lack of fit—namely, husband's change in affiliation—an alternative structural equation model, shown in Figure 7, was run that allows different effects for each interaction. Because this model is just-identified, it necessarily fits perfectly. As indicated by the coefficients on the paths, there was one very strong, statistically significant relation: In the no-induction interaction, husband's dysphoria was inversely related to husband's change in affiliation.

Figure 8 combines the foregoing significant effect of husband's dysphoria on husband's change in affiliation in the no-induction interaction with the corresponding, also significant effect of husband's dysphoria on wife's change in affiliation. When the husband was not dysphoric, the wife's and husband's levels of affiliation tended to increase slightly over the course of the interaction. In contrast, when the husband was dysphoric, both wife's and husband's levels of affiliation decreased steadily and substantially over the course of the interaction.

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Figure 6. Effects of high versus low wife's dysphoria on change in husband's and wife's dominance – interaction with no induction.

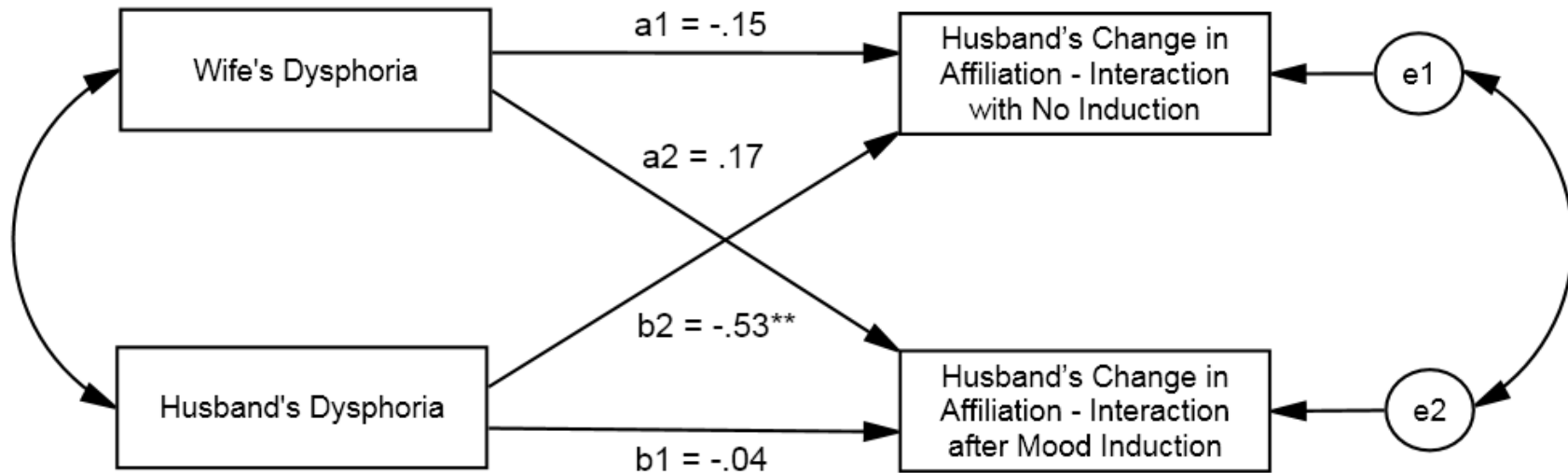Low Wife's Dysphoria

High Wife's Dysphoria
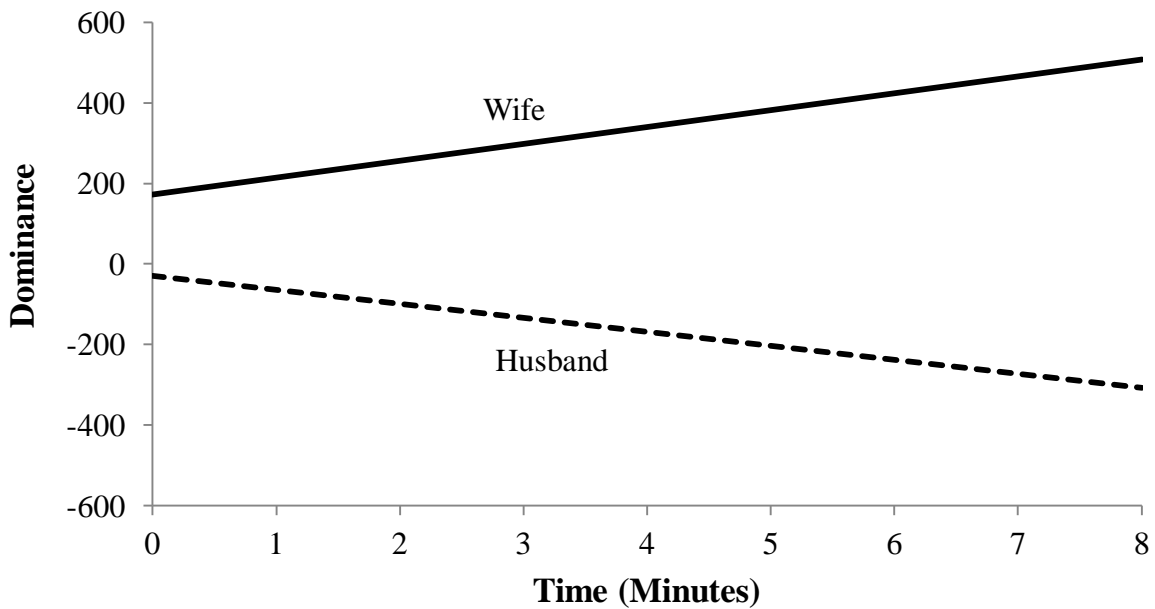
Note. For low dysphoria, BDI-II = 0; for high dysphoria, BDI-II = 28.5.

Figure 7. Structural equation model for husband's change in affiliation, allowing different effects for each interaction.

Note. a1 and a2 allow different effects of wife's dysphoria for each interaction; likewise, b1 and b2 allow different effects of husband's dysphoria.

Figure 8. Effects of high versus low husband's dysphoria on change in husband's and wife's affiliation – interaction with no induction.

Low Husband's Dysphoria

High Husband's Dysphoria

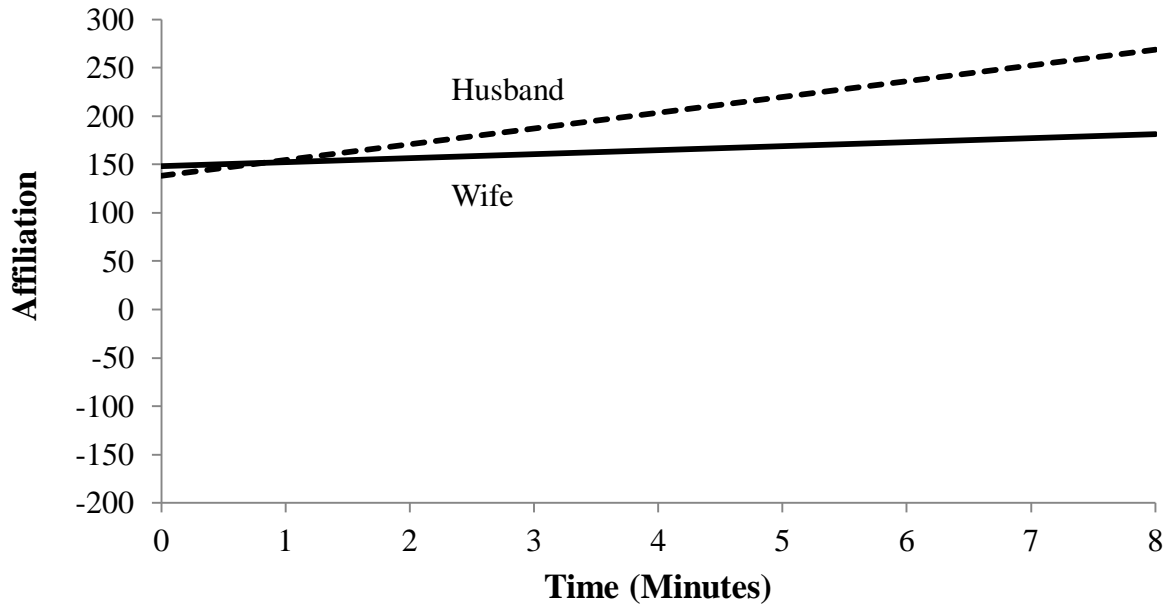*Note.* For low dysphoria, BDI-II = 0; for high dysphoria, BDI-II = 28.5.

Discussion

The main purpose of the present study was to use a novel method of assessing interpersonal behaviour in order to examine how dysphoria in either spouse may affect across-time patterns of interpersonal behaviour. We paid special attention to the possibility of important gender differences in the effects of dysphoria. The interpersonal behaviours investigated were dominance and affiliation, which were captured for each partner from moment-to-moment in each of their two interactions. Such time-sensitive data allowed us to investigate two major types of interaction dynamics: each partner's linear change (i.e., interdependent shifts) over the course of the interaction and the degree of entrainment (i.e., interdependent oscillations) between partners during the interaction.

The interaction-dynamics variables captured a wide variation in interdependent shifts and interdependent oscillations in the couples. In addition, these phenomena tended to be very consistent with the principle of interpersonal complementarity: both linear changes and recurrent cycles tended strongly to be negatively related across partners for dominance and positively related for affiliation. These results lend further support to the work of Sadler et al. (2009) in showing that the joystick method captures interesting, theoretically meaningful interpersonal dynamics in interacting dyads.

One of the most interesting findings of the current study is that wife's and husband's dysphoria had strongly differentiated effects on the marital interaction dynamics. Wife's dysphoria affected the dynamics of dominance for both partners, whereas husband's dysphoria affected the dynamics of affiliation. Although previous studies have also revealed gender differences in marital communication (Johnson & Jacob, 1997; Johnson & Jacob, 2000;

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Schudlich et al., 2004), the impact of either spouse's dysphoria on time-dependent behavioural patterns is a unique finding.

Effects of Wife's Dysphoria

Our results indicate that greater dysphoria among wives is directly related to wife's overall change in dominance and inversely related to husband's overall change in dominance. That is, the higher the wife's dysphoria, the more dominant she became over the course of the interaction and the more submissive her husband became over time. These findings are consistent with the literature showing that women tend to be the managers of marital disagreements (e.g., Gottman & Krokoff, 1989). For instance, several studies have shown that women have a tendency to be more reactive to demands that are communal (e.g., Smith, Gallo, Goble, Ngu, & Stark, 1998; Smith, Limon, Gallo, & Ngu, 1996), and are more likely to confront disagreements in their marriage (e.g., Burke, Weier, & Harrison, 1976; Huston & Ashmore, 1986). We suggest that nondysphoric wives display good managerial abilities, whereas dysphoric wives do not manage the interaction appropriately. Specifically, if we view the wife as being the interpersonal engineer, if she is not dysphoric, she has full resources to manage the interaction appropriately. Due to her good managerial abilities, both partners tend to keep roughly the same level of dominance over the course of the marital discussion. When the wife is dysphoric, the requirement for her to manage the marital disagreement interaction is still present; however, as a result of her high dysphoria, she is unable to manage the discussion fittingly. Consequently, the wife becomes quite dominant over time (perhaps in an over controlling manner), and the husband becomes quite submissive.

Two important points regarding the effects of wife's dysphoria need to be addressed. First, although such an interaction would be expected according to interpersonal theory (i.e., as

one partner becomes more dominant, the other becomes more submissive), some researchers have argued that complementarity may not always be the most adaptive (e.g., Henry, Schacht, & Strupp, 1986; Tracey, 1993). For example, extreme oppositeness on dominance may result in one partner taking full control of the interaction and the other partner entirely withdrawing from the discussion. This would not be adaptive in marital disagreement interactions because partners are asked to work together to try and reach a solution.

Second, upon first inspection, the two findings of wife's dysphoria appear to be somewhat similar to the demand-withdraw phenomenon, which is a maladaptive communication pattern that has been observed in romantic relationships. Christensen and Heavey (1990) have documented that during marital disagreement interactions, couples may engage in a negative communication pattern in which one partner blames, nags, criticizes, or pressures the other for change, while the other partner withdraws or avoids the conflict. Both self-report and observational data has revealed that women demand significantly more than men (e.g., Christensen, Eldridge, Catta-Preta, Lim, & Santagata, 2006), whereas men withdraw significantly more than women (e.g., Heavey, Layne, & Christensen, 1993). However, although our results appear to illustrate this phenomenon, there are some striking differences between these findings and the existing literature on this communication pattern. For example, current observational methods code demanding behaviours and withdrawing behaviours in one of two ways. Some researchers employ a micro-level approach and measure either the length of time each partner engages in such behaviours over the course of an interaction, the frequency of specific behaviours each partner engages in during a marital discussion, or both (i.e., an index that takes into account the length of time and the frequency of behaviours). Other investigators employ a macro-level approach by having coders observe each separate interaction and

subsequently rate each partner (or both partners) on specific behavioural dimensions. Although the demand-withdraw pattern implies that a demanding behaviour from one partner will be followed by withdrawal from the other partner, it is impossible to detect whether this is what actually transpires during a marital interaction because time-dependent phenomena are not captured with such methods. Further, existing definitions of the demand-withdraw pattern are somewhat vague and make the cross-fertilization of the existing literature and results obtained in the current study difficult. For example, it is unclear whether demanding behaviour is always dominant and whether withdrawing behaviour is always submissive. Also, whether demanding and withdrawing behaviours are always hostile is unclear. Finally, the intensity of these specific behaviours is often not measured. In sum, although the current results appear to be similar to the demand-withdraw pattern, there are salient differences between the results of the current work and the existing literature on this phenomenon.

Effects of Husband's Dysphoria

Our results indicate that greater dysphoria among husbands is inversely related to the wife's overall change in affiliation and partners' coherence on affiliation. Specifically, the higher the husband's dysphoria, the less affiliative she became over time and the less entrained the partners tended to be on affiliation. When a second type of structural model was estimated that permitted an examination of the separate effects for each interaction (i.e., interaction with no induction vs. interaction after mood induction), one additional effect was revealed of husband's dysphoria that was specific to the interaction with no induction. Specifically, when the wife does not receive a sad mood induction, the higher the husband's dysphoria, the less affiliative he became over time.

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Thus, perhaps greater dysphoria among husbands produces greater disturbances in the husband's ability to manage warmth appropriately. These findings are to some degree in line with Schudlich et al.'s (2004) research showing that husbands' dysphoria was associated with greater disturbances (such as, an increased use of negative conflict strategies) in marital communication. Interestingly, the significant finding of the no induction interaction seems to suggest that the husband may be adjusting his warmth when the wife receives a mood induction. Without the mood induction, partners with a dysphoric husband may enact their typical communication pattern, during which the husband becomes less affiliative over time.

Apart from the one effect discussed above, the wife's mood induction did not affect any other interaction-dynamics variables. Our results are in contrast to the findings reported in Rehman et al. (2010) whose work suggests that dysphoria in wives may only affect marital interactions when the wife is in a low mood. The differences in the coding of intimates' behaviour in the two studies may be contributing to these discrepant results. Specifically, Rehman and colleagues used a static method of coding communication behaviours whereas the current study captured time-dependent phenomena. In addition, the contrasting findings may have resulted due to the manner in which partner dysphoria was measured. Rehman and colleagues focused solely on the impact of wives' dysphoria on communication behaviours whereas the current project explored how dysphoria in either spouse may disrupt marital communication.

Entrainment on Dominance

Although dysphoria affected most interaction-dynamics variables in our study, surprisingly, neither wives' nor husbands' dysphoria affected partners' entrainment on dominance. Although previous research examining the effects of dysphoria has identified that

dysphoric partners tend to show lower levels of dominance (e.g., Gotlib & Whiffen, 1991; Ranelli & Miller, 1981), our findings demonstrate that when across-time patterns are explored, no significant differences emerge between intimates interacting with a nondysphoric spouse and couples interacting with a dysphoric partner. Entrainment on dominance may not be affected by dysphoria because in such marital disagreements, passing of control is necessary. Irrespective of partners' dysphoria levels, entrainment on dominance is needed since partners are asked to discuss each area of conflict and to try and reach a solution.

In contrast, entrainment on affiliation is not necessary for the discussion of a marital topic to occur. Partners may pass control back and forth skillfully and have low entrainment on affiliation (e.g., engage in a more "business-like" fashion) or high entrainment on affiliation (e.g., discuss an issue while also tracking each other's affiliative gestures, such as smiles, eye contact, laughter).

Implications

The current project extends past literature on dysphoria and marital communication in several ways. Overall, our findings suggest that dysphoria plays a significant role on the particular ways in which partners interact during marital interactions. Consistent with previous research utilizing self-report and observational coding methodologies, we found that dysphoria in either spouse is strongly related to marital communication. Therefore, although interactions in which one partner is experiencing dysphoria have been found to be overall less positive, more negative, and less congenial (e.g., Johnson & Jacob, 1997), examination of what actually occurs during these marital interactions using the computer joystick device shows that dysphoria has a strong influence on time-dependent phenomena, such as overall levels of interpersonal behaviour and partners' entrainment. Therefore, apart from investigating the presence and frequency or

duration of specific behaviours, it will also be important for future research to investigate marital communication through a more microscopic lens. Investigating time-dependent phenomena enables us to examine the presence of possible patterns in the couples' communication, which may be as important to explore as the length of time each partner spends engaging in a specific behaviour.

In addition, although a great deal of research has examined the effects of wives' dysphoria on marital communication, our project highlights the importance of including measures of dysphoria of both wives and husbands, as each partner plays a role in the intricate communication dance.

Finally, the results are relevant for clinical practice as well, as marital communication plays a key role in individual and couple therapy. For example, these results suggest that it may be fruitful to discuss the role each spouse and their respective moods may play in managing disagreements. This information in turn may be used to find appropriate alternatives to the destructive behavioural patterns intimates repeatedly enact in their everyday disagreements.

Limitations and Future Directions

Several limitations of this project need to be acknowledged. First, the cross-sectional design of the study does not allow us to measure the stability of across-time patterns of interpersonal behaviour, which is an issue that would benefit from future longitudinal research. Being able to track partners' across-time behavioural patterns in numerous interactions and over several occasions may be an important step in understanding how specific communication patterns are created, how they shift through time, and how they persist or fade.

Second, only overall levels of entrainment were examined in the present study, rather than shifts in entrainment across the course of an interaction. Thus, in our work we assumed that

the moment-to-moment time series data were *stationary*. This assumption implies that our statistical properties (e.g., coherence) are the same across the entire duration of the interaction. However, it may be true that some couples entrain strongly at the beginning or in the middle of their interactions, whereas others entrain strongly throughout their entire interactions. Future research should go beyond examining overall levels of entrainment between partners by examining entrainment at different times during an interaction. This task may be accomplished using the windowed cross correlation approach (Boker, Xu, Rotondo, & King, 2002), which allows researchers to assume nonstationarity in the data. Boker et al.'s analyses may be even more important for interactions that are much longer than eight minutes (e.g., twenty or thirty minutes). This significantly longer time frame clearly captures more behavioural variations and as such, may make the assumption of stationarity more difficult to meet.

Third, our study did not include an examination of additional factors that may have significant effects on the across-time patterns we investigated, such as relationship satisfaction and commitment. It will be important to examine the effects of wives' and husbands' dysphoria while controlling for such variables. It may also be important to include measures of partners' anxiety levels in order to accurately differentiate between the effects of dysphoria and those of anxiety given their high comorbidity.

Finally, in addition to having independent observers utilize the joystick to code partner's behaviours during interactions, future research should study individual differences in moment-to-moment patterns by having couples watch their own interactions and utilize the joystick to code their own behaviour as well as their partner's. In marital relationships, perception of interpersonal behaviours (as coded by partners) may be related very differently to dysphoria than actual behaviour (as coded by observers). Intimates may have their own idiosyncratic language

and behaviours that are specific to their relationship and unknown to independent coders. Therefore, coders and intimates may pick up on entirely different interpersonal behaviours and the relation of these behaviours to particular outcomes may be very different.

Conclusions

In conclusion, this study illuminates specific ways in which dysphoria in either spouse may play on managing marital disagreements in romantic relationships. The results show that wife's and husband's dysphoria disrupts patterns of interpersonal behaviour very differently during marital interactions. Therefore, including both partners' measures of dysphoria will be important in future work. Finally, this thesis shows the importance of examining time-dependent phenomena. People's interpersonal behaviour unfolds continuously in real time and capturing across-time patterns of behaviour allows researchers to understand what exactly transpires in marital discussions.

Footnotes

[1] In this manuscript we use both the terms "dysphoria" and "depression." Previous research has established that depression is better characterized dimensionally, rather than categorically. For instance, a comprehensive review of the literature conducted by Flett, Vrendenburg, and Krames (1997) concluded that most of the evidence supported a dimensional perspective. In addition, Angst and Merikangas (1997) conducted a prospective longitudinal study spanning 15 years and showed that major depression is both an antecedent to and sequela of subthreshold symptoms, which provides validity of the spectrum conceptualization of depression. Therefore, these and other studies propose that conceptualizing depression as falling on a continuum may be better and that the difference between dysphoria (i.e., subclinical levels) and clinical depression seems to be quantitative, rather than a qualitative. Nonetheless, the issue of how best to conceptualize depression continues to be debated in the literature. As such, we use the conservative term "dysphoria" when discussing our research.

[2] Interpersonal theorists use key terms such as *complementarity*, *reciprocity*, and *correspondence* very differently from the way such terms are utilized by researchers in other disciplines. For example, in interpersonal theory, the word *complementarity* is used as an umbrella term which covers both similarity of behaviour between partners (e.g., affiliation pulls for affiliation) and dissimilarity (e.g., dominance pulls for submissiveness). However, in the romantic relationships literature (e.g., Beach, Whitaker, Jones, & Tesser, 2001), the communication literature (e.g., Burgoon, Stern, & Dillman, 1995), and other social psychology research (e.g., Tiedens, Unzueta, & Young, 2007), complementarity is used to solely to describe occasions of dissimilarity. Further, in interpersonal theory, the word *reciprocity* refers to oppositeness on the dominance dimension and the word *correspondence* refers to sameness on the affiliation dimension.

However, in the communication literature, the term *reciprocity* refers to sameness and the term *compensation* refers to oppositeness (Burgoon et al., 1995). The underlying concepts discussed in these literatures are closely linked. Clearly, it is important that researchers be aware of such differences in terminology.

[3] The mood induction was only given to women because this project was part of a larger study examining the impact of wife's depression on marital functioning. As such, the husbands did not receive a mood induction.

[4] We conducted exploratory analyses to investigate the possibility of a statistical interaction between wife's and husband's levels of dysphoria. No such effects were statistically significant.

[5] The values 0 and 28.5 were used to graph the contrast in effects observed between partners who experienced no dysphoria and those who reported high levels of dysphoria. The value 28.5 was chosen because it falls between the moderate and severe categories of the BDI-II.

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