Title

Understanding Marital Communication among Ethnically Diverse Newlywed Couples Living with Low Incomes

Author

Ross, Jaclyn M

Publication Date

2021

Peer reviewed|Thesis/dissertation

UNIVERSITY OF CALIFORNIA

Los Angeles

Understanding Marital Communication among Ethnically Diverse Newlywed Couples Living with Low Incomes

A dissertation submitted in partial satisfaction of the

Requirements for the degree Doctor of Philosophy

in Psychology

by

Jaclyn M. Ross

2021

ABSTRACT OF THE DISSERTATION

Understanding Marital Communication among Ethnically Diverse Newlywed Couples Living with Low Incomes

by

Jaclyn M. Ross

Doctor of Philosophy in Psychology

University of California, Los Angeles, 2021

Professor Thomas Bradbury, Chair

Communication plays a key role in promoting the success of intimate relationships, but counterintuitive findings suggest that basic questions remain about how communication successfully promotes healthy relationships. This gap in understanding is likely due to three chief problems with current approaches to studying communication, all of which may inadequately describe the phenomenon: 1) Behaviors are traditionally characterized as either positive or negative, 2) Behavior is typically studied at the individual level, instead of as dyadic interactions, 3) Behavior is typically analyzed at the global, summative level, without acknowledging the most important momentary events within the interaction. The current dissertation proposed a new framework and accompanying coding system for studying communication that relies on two dimensions of behavior: *cooperation* (i.e., task-focused behavior) and *affiliation* (i.e., relationship-focused behavior). This work proposed that affiliation is the behavioral dimension

that dictates the success of communication in promoting relationship quality, while cooperation is only associated with relationship wellbeing to the extent that it is accompanied by affiliation or disaffiliation. Study 1 tested these ideas at the individual mean level, while also examining how dyadic sequences of interaction predict relationship satisfaction over time. At the individual level, affiliation and its interaction with cooperation were associated with relationship satisfaction cross-sectionally, while dyadic sequences of sustained affiliative or disaffiliative reciprocity distinguished between levels of satisfaction cross-sectionally and accounted for variability in trajectories over time. Study 1 suggests that relationship-focused behavior is the key element of communication that accounts for variability in relationship satisfaction levels and trajectories. Study 2 of this dissertation challenges the notions that all behaviors occurring within an interaction contribute equally to relationship satisfaction, and instead draws from the peak-end rule (Kahneman, 2000) to propose that communication quality at three brief moments in couple conversations—namely, at its most positive peak, at its least negative valley, and at the ending moments of the conversation—may be more strongly associated with partners' global judgments of relationship satisfaction. Higher peak values of husbands' cooperative behavior were associated with slower declines in wives' satisfaction, while higher valley values of husbands' affiliative behavior slowed declines in husbands' satisfaction, and higher ending values of wives' affiliative behavior slowed declines in wives' satisfaction. In sum, specific moments in couples' conversations appear to have greater predictive value than the overall aggregated valence of their behavior. These two studies reveal that considering relationship-focused behaviors, dyad-level processes, and uniquely meaningful moments of interaction is essential to understanding the constructive or destructive nature of communication processes.

The dissertation of Jaclyn Ross is approved.

Li Cai

Benjamin R. Karney

Theodore F. Robles

Thomas N. Bradbury, Committee Chair

University of California, Los Angeles

2021

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACKNOWLEDGMENTS

The data used in these studies were funded by Research Grant R01HD076566 from the National Institute of Child Health and Human Development awarded to Benjamin R. Karney.

I acknowledge with gratitude the instrumental support and mentorship of my advisor and committee chair, Dr. Thomas Bradbury, as I completed this dissertation. I am also tremendously appreciative of the role Dr. Benjamin Karney played in shaping this work, the support for statistical analyses Dr. Li Cai and quantitative graduate student, Teanna Feng, provided throughout this process, as well as the thoughtful feedback and encouragement Dr. Theodore Robles provided throughout this dissertation research. Thank you to the lab members of the UCLA Marriage Lab and my cohort in the UCLA Clinical Psychology program for their thoughtful feedback and support. Finally, to my partner, Frank, my dog, Trovi, and my friends and family – thank you for your endless support.

CURRICULUM VITAE

EDUCATION

Expected 2021	Doctor of Philosophy, Clinical Psychology University of California, Los Angeles
2015	Master of Arts, Psychology University of California, Los Angeles
2013	Bachelor of Science, Psychology, with honors Carnegie Mellon University

AWARDS, FELLOWSHIPS & GRANTS

2021-2022	NIMH T32 Postdoctoral Research Fellowship, "Training in the Neuroscience of Mental Health"
2021	Northwestern Medicine Clinical Scholar Award
2021	UCLA Michael J. Goldstein Distinguished Dissertation Award
2019-2020	UCLA Dissertation Year Fellowship ($20,000)
2016	UCLA Graduate Summer Research Mentorship ($6,000)
2015-2016	UCLA University Fellowship ($21,000)
2014	Carnegie Mellon University Dietrich College Summer Honors Fellowship ($4,000)
2012	Carnegie Mellon University Undergraduate Research Grant: Play in adult close relationships ($1,000)

PUBLICATIONS

Wolitzky-Taylor, K., Breland, H., **Ross, J.M**., Sewart, A. (2020). A preliminary test of the efficacy of brief self-administered behavioral interventions for rumination. *Behavior Modification.* Advance online publication.

Hammett, J. F., **Ross, J. M.,** Karney, B. R., & Bradbury, T. N. (2020). Cumulative risk and intimate partner violence. *Psychology of Violence.* Advance online publication.

Ross, J.M., Nguyen, T.P., Karney, B.R., & Bradbury, T.N (2019). Intimacy. In *Macmillan Encyclopedia of Families, Marriages, and Intimate Relationships*. (Vol. 2, pp. 480-485). Detroit, MI: Gale.

Ross, J.M., Karney, B.R., Nguyen, T.P., & Bradbury, T.N. (2019). Communication that is maladaptive for middle-class couples is adaptive for socioeconomically disadvantaged Couples. *Journal of Personality and Social Psychology, 116(4),* 582.

Williamson, H.C., Hammett, J.F., **Ross, J.M.**, & Bradbury, T.N. (2018). Premarital Education and Later Relationship Help-Seeking. *Journal of Family Psychology, 32*(2), 276.

Ross, J.M., Girard, J.M., Wright, A.G.C., Scott, L.N., Beeney, J.E., Hallquist, M.N., Lazarus, S.A., Stepp, S.D., & Pilkonis, P.A. (2017). Momentary patterns of covariation between specific affects and interpersonal behavior: linking relationship science and personality assessment. *Psychological Assessment, 29*(2), 123.

PRESENTATIONS

Ross, J.M., Karney, B.R., Nguyen, T.P., & Bradbury, T.N. (May, 2018). *Communication that is Maladaptive for Middle-Class Couples is Adaptive for Lower-Income Couples*. Paper presented as part of the symposium *Understanding Couple Communication in Context of Vulnerabilities and Stressors*, **J.M. Ross** (chair), at the 30th annual meeting of the Association for Psychological Science, San Francisco, CA.

Ross, J.M., Girard, J.M., Wright, A.G.C., Scott, L.N., Beeney, J.E., Hallquist, M.N., Lazarus, S.A., Stepp, S.D., & Pilkonis, P.A. (July, 2017). *Momentary patterns of covariation between specific affects and interpersonal behavior: linking relationship science and personality assessment*. Paper presented at the 20th annual meeting of the Society for Interpersonal Theory and Research, Pittsburgh, PA.

Ross, J.M., Karney, B.R., & Bradbury, T.N. (October, 2016). *Inequity of Social Support and Relationship Outcomes: A Longitudinal Study*. Poster presented at the 50th annual meeting of the Association for Behavioral and Cognitive Therapies, New York, NY.

Ross, J.M., Karney, B.R., & Bradbury, T.N. (May, 2016). *Stress, Satisfaction, and Couple Communication as Predictors of Relationship Outcomes*. Poster presented at the 28th annual meeting of the Association for Psychological Science, Chicago, IL.

Wright, A.G.C., **Ross, J.M**., Girard, J.M., Scott, L.N., Beeney, J.E., Hallquist, M.N., Stepp, S.D., & Pilkonis, P.A. (October, 2015). *Personality pathology and momentary interpersonal behavior during conflict resolution*. Paper presented as part of the symposium *Interpersonal processes in personality disorders: From the person to the network*, A.G.C. Wright (chair), at the 29th annual meeting of the Society for Research in Psychopathology, New Orleans, LA.

GENERAL INTRODUCTION

Our physical and emotional wellbeing, our success at work, and our ability to raise healthy children are all enhanced by the quality of our closest relationships (e.g., Kiecolt-Glaser & Newton, 2001). When these relationships falter, people struggle, and the social bonds that were once a powerful asset put people at risk for a wide range of adverse outcomes (Amato, 2001). Because intimate relationships are so salient for overall wellbeing, research on their processes and outcomes is vital to inform prevention and intervention efforts for relationship distress and dissolution (Baucom, Shoham, Mueser, Daiuto, & Stickle, 1998).

Observational study of marital interactions began in the 1970s (Weiss, Hops, & Patterson, 1973), prompting scholarly interest in generating and refining coding systems that provide a rich, yet comprehensive portrait of relationship functioning while also offering predictive power and theoretical clarity. As pioneers of observational research, Robert L. Weiss and Gerald R. Patterson were the first to elucidate the linkage between positive and negative behaviors and relationship quality via video recording of couples engaging in laboratory-based problem-solving tasks. As the field of observational research on marital interaction evolved, a theoretical framework for characterizing behavior supported by consistent, empirical findings emerged, underscoring the promise of this burgeoning area of study. Relationship scientists and couple therapists, including Harold Raush, Robert L. Weiss, John Gottman, Gayla Margolin, and Neil Jacobson, began to study the dysfunctional patterns of communication that emerge during conflict. Situated within the well-established social learning theory (Bandura, 1977), these scholars hypothesized that behavioral interdependence is determined by partners' patterns of reinforcing and punishing behaviors (Jacobson & Margolin, 1979). This framework asserted that partners may unintentionally reward one another's negative behaviors during conflict, which can

breed relationship distress. One consistent observation throughout this work is that married couples are more satisfied to the extent that they exchange lower levels of negativity and higher levels of positivity (Gottman, 1979; Hahlweg, Revenstorf, & Schindler, 1984; Levenson & Gottman, 1983; Margolin & Wampold, 1981; Raush, Barry, Hertel, & Swain, 1974; Schaap, 1982; Ting-Toomey, 1982). The development of techniques to conduct sequential analyses of couple communication, allowing for the prediction of one spouse's behavior using knowledge of their partner's behavior immediately beforehand, offered a method of refining this picture. These analyses revealed that distressed spouses tend to engage in communication patterns with greater predictability and have more difficulty disengaging from negative cycles of interaction (e.g., Gottman, 1979), while also being more likely to reciprocate negativity during their interactions than their non-distressed counterparts (e.g., Billings, 1979; Raush et al., 1974). In these ways, observational research yielded a large body of findings that described how different forms of communication were diagnostic of relationship functioning.

Despite the initial promise of this research, however, a collection of inconsistent findings also emerged, suggesting that scholars may not adequately understand the association between communication and marital quality and therefore are not equipped to design the most effective interventions for relationship distress. Even as most evidence confirms that negative behaviors like anger, disagreement, and criticism predict declines in relationship satisfaction (e.g., Kiecolt-Glaser, Bane, Glaser, & Malarkey, 2003; Rogge & Bradbury, 1999), other contradictory findings reveal that some negative behaviors are associated with improved relationship satisfaction over time (Gottman & Krokoff, 1989; Heavey, Layne, & Christensen, 1993; Karney & Bradbury, 1997; Overall, Fletcher, Simpson, & Sibley, 2009), or that levels of expressed negativity simply do not distinguish trajectories of marital satisfaction (Bradbury & Karney, 1993, Filsinger &

Thoma, 1988; Gottman, Coan, Carrere, & Swanson, 1998). Inconsistencies emerge even with positively-valenced behaviors, suggesting that behaviors like agreement and humor can undermine relationship satisfaction (Cohan & Bradbury, 1997; Gottman & Krokoff, 1989).

Equally troubling are findings that that interventions targeting communication have not been as successful as clinical scientists had hoped. Although couples interventions targeting communication, such as Integrative Behavioral Couples Therapy (IBCT; Jacobson & Christensen, 1998) and Traditional Behavioral Couples Therapy (TBCT; Jacobson & Margolin, 1979) are reasonably successful in alleviating relationship distress, it appears that the communication skills enhanced by these treatments are not what is driving long-term relationship improvement (Baucom et al., 2011), leaving important questions unanswered about mechanisms of change in the therapeutic process. Indeed, interventions' success in producing positive behavioral changes often have not translated to increased relationship satisfaction. Existing intervention studies testing the pathway from behavior to satisfaction have yielded null, counterintuitive, and inconsistent results, suggesting at times that increases in positive communication are associated with worse relationship outcomes (Schilling, Baucom, Burnett, Allen, & Ragland, 2003), that decreases in negative communication do not benefit relationships (Stanley, Rhoades, Olmos-Gallo, & Markman, 2007), that increases in negative communication are linked with improved relationship satisfaction (Bodenmann, Bradbury, & Pihet, 2008), and that improvements in communication do not mediate effects of treatment on satisfaction (Williamson et al., 2016).

In sum, despite decades of research investigating communication, these discrepancies in basic and applied research imply that the field still lacks a clear answer as to what elements of

couples' behavior contribute to communication that successfully promotes relationship wellbeing.

Here I argue that existing theory and accompanying measurement of couple communication is failing to reflect the phenomenon accurately in a number of ways. The first premise of this dissertation is that the surprising and inconsistent findings in the literature can be attributed to a misunderstanding about the function of communication and, in turn, about what constitutes constructive and destructive communication. It may be the case that existing observational coding systems' categorization of behaviors broadly as either positive or negative is misrepresenting or oversimplifying the nature of couple communication. For example, although some negative behaviors (e.g., contempt, belligerence) likely derail conflict resolution and create emotional distance between partners, other oppositional behaviors (e.g., blaming the partner for a specific problematic behavior) may serve positive functions of promoting conflict resolution and generating a unified understanding of the problem among partners (Overall & McNulty, 2017). Yet despite their diverging functions, blaming the partner for his/her role in the problem and showing contempt and belligerence are typically combined into the same negative category in current observational coding systems. As a consequence, negativity becomes conflated with any kind of disagreement, and this may result in an overgeneralization of negative behavior, which may account for counterintuitive findings.

The second premise of this dissertation is that researchers may be oversimplifying the complex nature of couple communication by focusing on mean level differences in frequencies of individual behaviors rather than dyadic patterns of interaction as they unfold in real time. Scholars commonly use observational coding systems like the Iowa Family Rating System (IFIRS; Melby et al., 1998) that code each spouse's behaviors at the molar level as opposed to

the molecular level (i.e., rating intensity and frequency behaviors globally over the course of the entire interaction as opposed to rating behaviors every speaking turn or in brief time intervals), and then typically compare mean levels of *individuals'* positive and negativity in analyses of communication-satisfaction associations. This approach offers only a static and coarse understanding of the phenomenon and fails to account for the dyadic nature of couple communication. Instead, this approach assumes that partners' behaviors occur independently, without influencing one another, despite a well-established understanding that behavioral interdependence is a defining feature of intimate relationships (Thibaut & Kelley, 1959). Spouses' behaviors do not occur in a vaccum, independent of the other partner's actions; instead one spouse's behavior prompts changes in the other partner's behavior prompting couple-level patterns of interaction (Duncan et al., 1984). Thus, treating behaviors as static and individual mischaracterizes the phenomenon. Even molecular-level systems (i.e., those that rate behaviors every speaking turn or every second), like the Marital Interaction Coding System (MICS; Hops, Wills, Patterson & Weiss, 1972) and the Specific Affective Coding System (SPAFF; Gottman et al., 1996) are limited in their ability to study effectively study dyadic, dynamic sequences of behavior. Both the MICS and the SPAFF rate behaviors categorically, such that individuals can receive one mutually exclusive code per second. While this approach allows for examination of highly specific sequences (i.e., Blame → Withdrawal), it fails to capture how fluctuations in intensity and valence of behavior, or blends of multiple behaviors, are exchanged among partners.

Third, by studying spouse's global positivity or negativity as an accumulation of behaviors over the course of the entire interaction, scholars are ignoring the possibility that some moments of interaction may matter more than others in their influence on relationship quality.

Cognitive psychology literature suggests that evaluations of affective experiences are influenced less by the accumulated ratings of the entire experience and more by the most intense moments and by the endpoints of those experiences (Fredrickson & Kahneman, 1993). This same principle may apply to couple interaction, such that the most consequential moments of interaction occur during spouses' peak behavioral displays and at the conclusion of their discussions. Thus, assigning couple members a summary score for all behaviors they enact over the course of the interaction, without measuring behavior continuously, fails to assign weights to the specific moments of interaction that are most diagnostic of the interpersonal processes that produce change in relationship satisfaction.

To address these limitations, the current dissertation presents two studies that examine how communication is associated with relationship outcomes over time. As the foundation of all analyses, I introduce *CODA* (Cooperation-Opposition, Disaffiliation-Affiliation), a novel observational coding system that describes two dimensions of communication: affiliation/disaffiliation and cooperation/opposition. By relying on two dimensions of interpersonal behavior, viz., cooperation/opposition and affiliation/disaffiliation, this system moves beyond categorizing interpersonal behavior as either positive or negative while offering a means for describing the interpersonal nature of agreement and disagreement. The first dimension, *cooperation/opposition*, is problem-focused and thus captures whether communication is expressing agreement and aligned goals or disagreement and opposing goals. The second dimension, *affiliation/disaffiliation*, is relationship-focused, specifying whether or not communication functions to promote communion, or connectedness. The affiliation dimension is comprised of behaviors communicating love, union, and friendliness. I propose that affiliation, communicating communion or connectedness, can color the cooperation or opposition

expressed among partners, thereby leading to different implications for relationship outcomes.

This novel framework has the potential to advance research in this area by shifting from a) the prevailing view that partners' positive and negative behaviors serve as rewards and punishments that determine relationship satisfaction to b) the view that agreement or disagreement among spouses is successful in promoting relationship quality to the extent that it also conveys interpersonal warmth and closeness as opposed to hostility and distance. Moreover, the technology accompanying the proposed observational coding system measures the valence and intensity of behavior continuously, on a moment-to-moment basis, which can be leveraged to answer important questions about the dyadic and temporal factors of communication that correlate with and predict relationship wellbeing.

Relying on these two dimensions of communication (cooperation and affiliation), the two studies of this dissertation aim to resolve ambiguity in the communication literature and to clarify associations between communication and relationship quality over time. Study 1 investigates how global levels of individual behavior and moment-to-moment dyadic sequences of behavior are linked with relationship satisfaction over time. Study 2 examines temporal factors of communication, specifically testing how the most intense, meaningful moments during marital interaction account for variability in relationship quality longitudinally, over and above global levels of behavior. Together, these two studies will explore previously untested processes of interpersonal behavior that may be critical to communication that successfully promotes relationship wellbeing over time. Findings of this work have the potential to inform future prevention and intervention programs aimed at strengthening communication skills in service of preventing and treating relationship distress and dissolution.

References

Amato, P. R. (2001). Good enough marriages: Parental discord, divorce, and children's long-term well-being. *Virginia Journal of Social Policy the Law, 9*, 71-94.

Bandura, A., & Walters, R.H. (1977). *Social learning theory* (Vol. 1). Englewood Cliffs, NJ: Prentice-hall.

Baucom, K. J., Sevier, M., Eldridge, K. A., Doss, B. D., & Christensen, A. (2011). Observed communication in couples two years after integrative and traditional behavioral couple therapy: Outcome and link with five-year follow-up. *Journal of Consulting and Clinical Psychology, 79*(5), 565-576.

Baucom, D. H., Shoham, V., Mueser, K. T., Daiuto, A. D., & Stickle, T. R. (1998). Empirically supported couple and family interventions for marital distress and adult mental health problems. *Journal of Consulting and Clinical Psychology, 66*(1), 53-88.

Billings, A. (1979). Conflict resolution in distressed and nondistressed married couples. *Journal of Consulting and Clinical Psychology, 47*(2), 368-376.

Bodenmann, G., Bradbury, T. N., & Pihet, S. (2008). Relative contributions of treatment-related changes in communication skills and dyadic coping skills to the longitudinal course of marriage in the framework of marital distress prevention. *Journal of Divorce & Remarriage, 50*(1), 1-21.

Bradbury, T. N., & Karney, B. R. (1993). Longitudinal study of marital interaction and dysfunction: Review and analysis. *Clinical Psychology Review, 13*(1), 15-27.

Cohan, C. L., & Bradbury, T. N. (1997). Negative life events, marital interaction, and the longitudinal course of newlywed marriage. *Journal of Personality and Social Psychology, 73*(1), 114-128.

Duncan, S., Kanki, B. G., Mokros, H., & Fiske, D. W. (1984). Pseudounilaterality, simple-rate variables, and other ills to which interaction research is heir. *Journal of Personality and Social Psychology, 46*(6), 1335.

Filsinger, E. E., & Thoma, S. J. (1988). Behavioral antecedents of relationship stability and adjustment: A five-year longitudinal study. *Journal of Marriage and the Family, 50*(3), 785-795.

Fredrickson, B. L. (2000). Extracting meaning from past affective experiences: the importance of peaks, ends, and specific emotions. *Cognition and Emotion, 14*(4), 577-606.

Gottman, J. M. (1979). *Marital interaction: Experimental investigations*. New York, New York: American Press.

Gottman, J., Coan, J., Carrere, S., & Swanson, C. (1998). Predicting Marital Happiness and Stability from Newlywed Interactions. *Journal of Marriage and Family, 60*(1), 5-22.

Gottman, J. M., & Krokoff, L. J. (1989). Marital interaction and satisfaction: A longitudinal view. *Journal of Consulting and Clinical Psychology*, *57*, 47–52.

Hahlweg, K., Revenstorf, D., & Schindler, L. (1984). Effects of behavioral marital therapy on couples' communication and problem-solving skills. *Journal of Consulting and Clinical Psychology, 52*(4), 553-566.

Heavey, C. L., Layne, C., & Christensen, A. (1993). Gender and conflict structure in marital interaction: A replication and extension. Journal of consulting and clinical psychology, 61(1), 16-27.

Jacobson N.S., Christensen A. (1998). Acceptance and change in couple therapy: A therapist's guide to transforming relationships. New York: Norton.

Jacobson, N. S., & Margolin, G. (1979). *Marital therapy: Strategies based on social learning and behavior exchange principles.* New York, New York: Brunner/Mazel.

Kahneman, D. (2000). Evaluation by moments: past and future. In D. Kahneman, & A. Tversky, *Choices, Values, and Frames.* New York: Cambridge University Press.

Karney, B. R., & Bradbury, T. N. (1995). The longitudinal course of marital quality and stability: A review of theory, methods, and research. *Psychological Bulletin, 118*, 3-34.

Karney, B.R., & Bradbury, T.N. (1997). Neuroticism, marital interaction, and the trajectory of marital satisfaction. *Journal of Personality and Social Psychology, 72,* 1075-1092.

Kiecolt-Glaser, J.K., & Newton, T.L. (2001). Marriage and health: his and hers. *Psychological Bulletin, 127*(4), 472-503.

Kiecolt-Glaser, J. K., Bane, C., Glaser, R., & Malarkey, W. B. (2003). Love, marriage, and divorce: newlyweds' stress hormones foreshadow relationship changes. *Journal of consulting and clinical psychology, 71*, 176.

Levenson, R. W., & Gottman, J. M. (1983). Marital interaction: physiological linkage and affective exchange. *Journal of personality and social psychology, 45*, 587.

Margolin, G., & Wampold, B. E. (1981). Sequential analysis of conflict and accord in distressed and nondistressed marital partners. *Journal of Consulting and Clinical Psychology, 49*, 554–567.

Melby, J., Conger, R., Book, R., Rueter, M., Lucy, L., Repinski, D., . . .Scaramella, L. (1998). The Iowa Family Interaction Rating Scales (5th ed.). Unpublished manuscript, Institute for Social and Behavioral Research, Iowa State University, Ames, Iowa.

Overall, N. C., Fletcher, G. J., Simpson, J. A., & Sibley, C. G. (2009). Regulating partners in intimate relationships: The costs and benefits of different communication strategies. *Journal of Personality and Social Psychology, 96*, 620-639.

Raush, H. L., Barry, W. A., Hertel, R. K., & Swain, M. A. (1974). *Communication conflict and marriage*. San Francisco: Jossey-Bass.

Roddy, M. K., Nowlan, K. M., Doss, B. D., & Christensen, A. (2016). Integrative behavioral couple therapy: Theoretical background, empirical research, and dissemination. *Family process, 55*(3), 408-422.

Rogge, R. M., & Bradbury, T. N. (1999). Recent advances in the prediction of marital outcomes. In R. Berger & M. T. Hannah (Eds.), *Preventive approaches in couples therapy* (pp. 331-360). Philadelphia, PA, US: Brunner/Mazel.

Ross, J. M., Girard, J. M., Wright, A. G., Beeney, J. E., Scott, L. N., Hallquist, M. N., Lazarus, S. A., Stepp, S. D., & Pilkonis, P. A. (2017). Momentary patterns of covariation between specific affects and interpersonal behavior: Linking relationship science and personality assessment. *Psychological assessment*, *29*(2), 123–134.

Schaap, C. (1982). Communication and adjustment in marriage. The Netherlands Swets & Feitlinger.

Schilling, E. A., Baucom, D. H., Burnett, C. K., Allen, E. S., & Ragland, L. (2003). Altering the course of marriage: the effect of PREP communication skills acquisition on couples' risk of becoming maritally distressed. *Journal of family psychology, 17*, 41.

Stanley, S. M., Markman, H. J., & Whitton, S. W. (2002). Communication, conflict, and commitment: Insights on the foundations of relationship success from a national survey. *Family process*, *41*(4), 659-675.

Stanley, S. M., Rhoades, G. K., Olmos-Gallo, P. A., & Markman, H. J. (2007). Mechanisms of change in a cognitive behavioral couples prevention program: Does being naughty or nice matter?. *Prevention Science, 8*(3), 227-239.

Thibaut, J. W., & Kelley, H. H. (1959). *The social psychology of groups.* New York, NY: Wiley.

Ting-Toomey, S. (1982). An analysis of verbal communication patterns in high and low marital adjustment groups. Human Communication Research, *9*, 291-302.

Weiss, R. L., Hops, H., & Patterson, G. R. (1973). A framework for conceptualizing marital conflict: A technology for altering it. Some data for evaluating it. In F. W. Clark & L. A. Hamerrynck (Eds.), *Critical issues in research and practice: Proceedings of the Fourth Banff International Conference on Behavior Modification* (pp. 309- 342). Champaign, IL: Research Press.

Williamson, H. C., Altman, N., Hsueh, J., & Bradbury, T. N. (2016). Effects of relationship education on couple communication and satisfaction: A randomized controlled trial with low-income couples. *Journal of Consulting and Clinical Psychology, 84*, 156-166.

Woodin, E. M. (2011). A two-dimensional approach to relationship conflict: Meta-analytic findings. *Journal of Family Psychology, 25*, 325-335.

STUDY 1:

Distinguishing Task-Oriented and Relationship-Oriented Behaviors to Investigate the Effects of Couple Communication on Relationship Satisfaction

Introduction

Intimate relationships are largely defined by behavioral interdependence (Thibaut & Kelley, 1959), and intervention researchers (Roddy, Nowlan, Doss & Christensen, 2016), practicing psychotherapists (Halford, 2015), and relationships scientists (Stanley, Markman & Whitton, 2002) all agree that communication is a central feature of relationship functioning. Indeed, observed communication is reliably associated with relationship satisfaction (Woodin, 2011) and has significant implications for longitudinal trajectories of relationship satisfaction (e.g., Karney & Bradbury, 1995). Understanding the specific processes of communication that unite and divide intimate partners is therefore essential to developing interventions aimed at maintaining and improving relationship wellbeing.

A leading framework for understanding marital communication, derived from social learning theory (Bandura, 1977), states that behavioral interdependence is defined by the patterns of rewarding and punishing behaviors that partners enact towards one another (Jacobson & Margolin, 1979). This learning-based framework suggests that partners may inadvertently reward one another's negative behaviors during conflict. For example, one partner's expression of hostility can prompt the other to withdraw, allowing for a temporary diffusion of the conflict and a reduction in both spouses' emotional intensity, therefore reinforcing spouses' displays of hostility and withdrawal, making them more likely to recur. While temporarily rewarding, these behaviors ultimately thwart discussion of significant relationship problems and lead to dysfunctional patterns of interaction over time. Thus, reinforcement of negative communication

behaviors between partners may be a source of relationship distress (Jacobson & Margolin, 1979), and distressed married couples exchange higher levels of negativity and lower levels of positivity during conflict than do satisfied married couples (e.g., Levenson & Gottman, 1983; Margolin & Wampold, 1981).

However, the association between communication and the development of marital quality over time may be more complex than initially understood. While negative behaviors like disagreement, criticism, anger, predict declines in relationship satisfaction in some cases (Kiecolt-Glaser, Bane, Glaser, & Malarkey, 2003; Rogge & Bradbury, 1999), these same negative behaviors have also been associated with greater relationship satisfaction over time (Gottman & Krokoff, 1989; Heavey, Layne, & Christensen, 1993; Karney & Bradbury, 1997; Overall, Fletcher, Simpson, & Sibley, 2009), while some positive behaviors, like agreement and humor, have been associated with lower relationship satisfaction (Cohan & Bradbury, 1997; Gottman & Krokoff, 1989). Still other studies have found no difference in trajectories of marital quality for partners who do or do not enact negative behaviors (Bradbury & Karney, 1993, Filsinger & Thoma, 1988; Gottman, Coan, Carrere, & Swanson, 1998).

Concerns about the recurrent null, counterintuitive, and inconsistent associations between communication and relationship outcomes have been exacerbated by the fact that interventions targeting communication have not been as successful as may have been expected given the early promise of observational research. While some interventions aiming to promote more positive communication among couples have been successful in yielding these behavioral improvements, improved communication does not necessarily translate to improvements in relationship satisfaction. Increases in positive communication may damage relationships (Schilling, Baucom, Burnett, Allen, & Ragland, 2003), decreases in negative communication may not be beneficial

for relationships (Stanley, Rhoades, Olmos-Gallo, & Markman, 2007), and increases in negative communication can be helpful for relationships (Bodenmann, Bradbury, & Pihet, 2008). Moreover, improvements in communication fail to mediate effects of treatment on satisfaction (Williamson et al., 2016).

These surprising inconsistencies raise questions about the true function of positive and negative communication in committed partnerships and therefore suggest that the task of characterizing communication behaviors as constructive or destructive may be more complex than originally anticipated. Is the purpose of communication to resolve relationship problems or is it to promote closeness and connection among partners? If we assume that the function of marital conflict communication is to solve problems (e.g., Overall & McNulty, 2017), then behaviors like agreement and solution brainstorming should be closely related to positive relationship outcomes. However, it is often with these kinds of behaviors that we see counterintutive or null findings in the literature (e.g., Cohan & Bradbury, 1997). Focusing on the outcome of resolution of targeted problems may be problematic given work suggesting that, despite changes in marital satisfaction over time, marital problems tend to stay relatively stable (Lavner et al., 2014), a finding that aligns with clinical observations that selecting a committed partner entails "choosing a particular set of unresolvable problems" (Wile, 1988, p. 263). Given that problems are likely to remain unchanged and many may not be solvable, it may be at least as important to evaluate whether communication promotes intimacy and closeness between partners, as it is to examine whether communication facilitates resolution of problems. When focusing on relationship satisfaction as the most relevant outcome, the greater predictive payoff may come from studying the behaviors that draw couples closer together or that push them further apart.

Studying Communication Based on Two Dimensions: Cooperation and Affiliation

The current study aims to clarify what constitutes positive and negative communication by studying how behaviors aimed toward problem resolution and behaviors aimed toward shared connection, individually and in combination, relate to changes in marital quality over time. To do so we propose a new framework for understanding communication based on two dimensions that function to enhance or damage relationship quality: cooperation/opposition and affiliation/disaffiliation. This organizing system aims to capture the nuances of interpersonal behavior by viewing actions as a blend of two distinct domains in service of shifting understanding of communication processes from the traditional classification of behaviors as positive or negative, and instead describing the interpersonal nature of agreement and disagreement. The cooperation/opposition dimension specifies whether communication is expressing agreement and aligned goals or disagreement and opposing goals, consistent with the definition put forth by other scholars studying communication (Overall & McNulty, 2017). The poles of this dimension are intense agreement and alignment of motivations versus intense disagreement and misalignment of motivations. For example, working collaboratively with the partner to generate a mutually beneficial solution is at the pole of cooperation (e.g., "let's work together to solve this problem"). In contrast, wholly blaming the partner for the problem being discussed is at the pole of opposition (e.g., "this is completely your fault").

The affiliation/disaffiliation dimension draws from interpersonal theory (Leary, 1957; Kiesler, 1983; Sullivan, 1953), evolutionary theory (Buss, 1996), motivational theory (McClelland, 1987), and the Big 5 model of personality (McCrae & Costa, 1989), and has been considered "the ink with which human action is written" (Luxen, 2005, p. 332). Affiliation functions to promote communion (Bakan, 1966), or connectedness, and is comprised of

behaviors communicating love, union, and friendliness. This dimension includes the extreme poles of friendliness and hostility. For example, expressing love and affection by kissing the partner or saying "I love you" is at the pole of affiliation. In contrast, insulting the partner's character or saying "I can't stand you" is at the pole of disaffiliation.

By describing communicative acts as combinations of cooperation/opposition and affiliation/disaffiliation, we hope to disentangle these two distinct components of communication that likely serve different functions. While the cooperation dimension is more problem-focused, affiliation is more relationship-focused; the cooperation dimension reflects communication about the conflict at hand, in which partners express varying degrees of agreement and alignment with one another about the problem being discussed, whereas the affiliation dimension reflects expressions of engagement and connectedness toward the partner and the relationship. While cooperative behavior may be critical for problem resolution, problems often go unsolved even among happy couples (Lavner et al., 2014) and relationship quality is not necessarily contingent on the resolution of problems. Thus, the affiliation dimension should be a strong predictor of the most salient dependent variable for couples -- relationship satisfaction -- because of its clear emphasis on the sharing of love and connection among partners.

Studying the blend of these dimensions of behavior may help to differentiate the harmful or constructive nature of disagreement, a variable traditionally characterized as a negative behavior, based on whether it is accompanied by behaviors that foster connection and engagement between partners. We expect that opposition, when accompanied by affiliation, may actually be harmless or even beneficial for relationships, while opposition that is simultaneously disaffiliative may be diagnostic of poorer relationship quality and foretelling of relationship deterioration. Similarly, it may be the case that cooperation is only successful in promoting

relationship quality to the extent that it is accompanied by affiliation. By making these distinctions, we hope to clarify the confusing findings that currently exist in the communication literature.

We will hereby refer to this new model of communication as CODA (Communication-Opposition/Disaffiliation-Affiliation). This model of communication, shown in Figure 1, depicts all interpersonal behavior as falling at various points organized around the two principle axes of cooperation and affiliation, and therefore naturally falling into quadrants that capture combinations of the dimensions that define the axes. This system extends existing theory and methodology for understanding and measuring couple communication in a number of ways. First, by measuring these two dimensions of interpersonal behavior, communication is understood as a blend of these orthogonal dimensions. For example, validation and self-disclosure are cooperative-affiliative behaviors (Quadrant 1; e.g., "I understand why you want to make our family bigger, but I'm not ready to get pregnant again because it makes me feel so insecure about my body"), non-hostilely faulting the partner's behavior is an oppositional-affiliative behavior (Quadrant 4; e.g., "Sometimes you drop the baby's blankets on the floor so they get dirty"). While passively assenting to the partner's demands without engagement or warmth is a cooperative-disaffiliative behavior (Quadrant 2; e.g., "Sure, whatever you want"), verbally attacking the partner by faulting his/her character is an oppositional-disaffiliative behavior (Quadrant 3; e.g., "What kind of stupid man are you to get yourself into a situation like that?"). Second, following the tradition of the interpersonal circumplex and its associated methodology by mapping interpersonal behavior on a circumplex (Wiggins, 1979), this system captures varying degrees of intensity falling within each of the quadrants. For example, lecturing or moralizing the partner (e.g., "You should know better") is a blend of moderate disaffiliation

and moderate opposition, while expressing contempt is a blend of severe disaffiliation and severe opposition (e.g., “You’re a lousy father”).

The Dyadic, Temporal Nature of Communication

A second and equally critical way to add theoretical clarity to the study of couple communication, beyond introducing this alternative framework for characterizing behaviors based on the two dimensions described, is to study behavior as it unfolds dyadically over time. The current inconsistencies in the literature may be the result not only of a mischaracterization of positive and negative behaviors, but also of the typical operationalization of couple interactions as a collection of static, discrete behaviors enacted by each spouse individually, rather than as a dyadic process that unfolds temporally, moment-by-moment. By rating behavior at a global level [i.e., collecting one summary rating of behavior over the course of a whole interaction as is done in popular coding systems such as the Iowa Family Rating System (IFIRS; Melby et al., 1998)], relationship scientists are likely overlooking critical details of dyadic communication. These molar coding systems cost researchers the fine-grained detail offered by moment-to-moment rating systems as well as the opportunity to analyze behavioral sequences as they unfold within the dyad. It may be the case that mean levels of behavior are not as revealing of relationship functioning as the dyadic processes that unfold between the spouses as the conversation progresses. By way of contrast, consider the Intimacy Process Model, a leading framework for understanding couple communication (Reiss & Shaver, 1988), which asserts that intimacy is a dyadic process that involves the exchange of disclosures and validation among partners. Studying disclosure or validation in isolation, as behaviors enacted by individuals, instead of studying the dyadic process by which these two behaviors are exchanged between both partners, fails to capture the phenomenon that the Intimacy Process Model proposes. The current work

aims to close this gap between phenomena and measurement by analyzing behavioral data as a temporal, dyadic process based on theoretically established patterns.

Decades ago, scholars leveraging coding systems that measured behavior repeatedly in brief intervals over the course of the interaction developed a line of work that was exciting because it described behavior at the dyadic level, testing questions that were interpersonal rather than individual. For example, Margolin and Wampold (1981) made use of sequential data to define dyadic sequences that distinguish distressed couples from non-distressed couples. This work revealed that distressed couples are more likely to reciprocate negativity over the course of an interaction, while non-distressed couples do not fall into this pattern. Similarly, Revenstorf et al. (1980) found that while non-distressed couple members are more likely to reciprocate one another's positivity, distressed couple members are more likely to reciprocate negativity and to meet even positive behaviors by the spouse with expressions of negativity. While this body of work moved the field toward a dyadic and dynamic conception of couple communication, the behavioral units of analysis used in this approach may fail to fully capture these processes. One of the major challenges of the majority of these systems is that they measure behavior categorically every second or during the speaking turns of each partner, possibly failing to capture valence and intensity *changes* in the continuous stream of behavior for each spouse.

Methodological weaknesses coupled with reliance on the traditional characterization of behaviors as "positive" or "negative," render these systems insufficient for measuring the dyadic processes that promote better or worse relationships. Thus, patterns like Margolin and Wampold's (1981) negative reciprocity are relatively crude concepts, which rely on imperfect methodology and lack explanations of the nuances that make negativity, or opposition, more or less successful in promoting relationship quality. Applying CODA to well-established dyadic

patterns of interaction, like negative reciprocity, offers the opportunity to refine understanding of what *kind* of negative behaviors are more likely to be reciprocated between dissatisfied partners. This new system adds nuance to "negativity" by allowing for analyses of how changes in affiliation and cooperation are reciprocated between satisfied and dissatisfied couples. For example, it may be the case that reciprocation of oppositional behavior does not distinguish between happy and unhappy couples or predict changes in satisfaction over time, but that reciprocation of disaffiliative behaviors is the form of negative reciprocity that is more diagnostic and predictive of dissatisfaction. Moreover, blends of these dimensions when reciprocated among partners likely have crucial implications for relationship quality. We can expect, for example, that disaffiliative, oppositional behavior may be particularly noxious for relationship wellbeing.

In addition to enhancing the theoretical clarity of the negative reciprocity principle with CODA, the current technology also allows for methodological refinement. The technology accompanying CODA uses a moment-to-moment method of measurement to capture the stream of interpersonal behavior as it unfolds temporally over the course of the interaction (Lizdek et al., 2012). Capturing each partner's behavior in the coordinate grid over the course of the interaction offers time series data of two continuous dimensions of behavior, affording the unique opportunity to test classic, sequential patterning concepts in relationship science with methodological refinement towards the goal of understanding the elements of communication, dyadically and temporally, that predict relationship outcomes. The underlying process taking place in reciprocity is a transfer of behavioral or affective states among partners, which indicates a degree of dyadic synchrony, for better or for worse depending on the valence of synchrony. Traditionally, research on reciprocity assesses whether pairs of categorical behaviors follow each

other sequentially at greater than chance rates (e.g., Levenson & Gottman, 1983), and behaviors are dichotomous (i.e., a behavior is rated as 0 if it did not occur and as 1 if it did occur). This approach relies on categorical variables determined each speaking turn (i.e., one partner receives a 0 or 1 rating, reflecting whether they did or did not display the behavior during their speaking turn). This approach likely has limited power and is crude in its measurement of fluid changes of affect and behavior as time progresses. Aligning more closely with the temporal, dyadic process, we adopt the strategy of analyzing *changes* in each partner's behavior over brief intervals of time in order to understanding how partners' fluctuating behavioral valences predict one another temporally. Moreover, with continuous ratings capturing the stream of interpersonal behavior, we are also afforded the opportunity to examine how the duration of reciprocal exchanges among partners, or how stuck they become in a given sequence, may relate to their marital quality over time.

The Current Study

The current study aims to resolve ambiguity in understanding how communication is linked with relationship outcomes by testing how two dimensions of behavior, one problem-focused and one relationship-focused, predict relationship satisfaction over time. We investigate how successfully cooperation and affiliation predict relationship quality longitudinally using three waves of data collected from low-income newlywed couples every 9 months. First, we examine mean levels of behavior aggregated over the course of the entire interaction. With these data, we predict that higher levels of affiliation will be associated with higher levels of relationship quality and less deterioration of relationship quality over time, over and above cooperation effects given affiliation's closer theoretical link with intimacy and closeness, which are hallmarks of relationship satisfaction. It is also likely that the two dimensions will interact,

such that higher levels of affiliation will heighten the positive effects of cooperation and ameliorate the damaging effects of opposition. We tested this prediction using an interaction term multiplying the aggregated mean scores for affiliation and cooperation. Next, we examine temporal dyadic sequences of behavior captured by this system to predict relationship satisfaction over time. Here we predict that greater levels and longer durations of affiliative reciprocity will be associated with higher levels of relationship quality and less steep declines of relationship quality over time, while higher levels and longer durations of disaffiliative reciprocity will be associated with worse relationship outcomes. Just as we predicted an interaction between the two dimensions when analyzing the aggregate data, we predict that a blend of the two dimensions will also be relevant for reciprocity effects, such that affiliative-oppositional reciprocity may have no adverse effects for relationship satisfaction, while disaffiliative-opposition reciprocity may covary with worse relationship outcomes cross-sectionally and longitudinally. Moreover, the reciprocation of affiliative-cooperative behavioral changes between partners should coincide with positive relationship outcomes, while disaffiliative-cooperative reciprocity should not have these same positive implications for relationship quality.

To study the development of marriage over time adequately, this study examines a sample of newlywed couples, which circumvents the common problem in marital research of the distressed and divorced couples already self-selecting out of the sample. This sample of newlyweds also includes far more ethnically diverse, low-income couples than the bulk of relationships research to date. This element of the design was vital to ensure that findings are generalizable to all segments of the population, rather than solely white, middle-class, college-educated couples.

Method

Participants

The current study sampled newlywed different-sex couples living in high-poverty neighborhoods in Harris County, Texas. Recently married couples were identified through names and addresses on marriage license applications. License records were obtained from the Harris County Recorder's Office between 2014 and 2015. Addresses were matched with census data to identify applicants living in high-poverty communities, defined as census block groups within Harris County for which 30% or more of the households were categorized by the census as living below poverty (U.S. Census Bureau, 2008-2012), and thereby oversampling an understudied and rarer population of couples living in high-poverty neighborhoods. Identified couples were screened on the telephone or in person to ensure that they had married, that neither partner had been previously married, and that they were not same-sex partners. A total of 4,916 couples were contacted through addresses listed on their marriage licenses. Of the couples contacted, 3,535 could not be reached and 1,157 agreed to be screened for eligibility. Of those, 506 couples were screened as eligible, and 401 of them agreed to participate in the study, with 231 couples actually completing the study. A few interactions were not recorded because participants declined (n = 10) or because the audio equipment malfunctioned (n = 5), leaving 216 couples available for this analysis.

The current sample included 216 couples identified with the above procedures. Wives ranged in age from 18 to 56 years (M = 28.21, SD = 7.48) and husbands ranged in age from 18 to 53 years (M = 29.60, SD = 7.60). Fifty-two percent of wives and 51% of husbands were Hispanic. Of the remaining participants, the majority of couple members were either Black (36% and 33%, respectively) or White (9% and 10%, respectively). Approximately 64% of couples

had children, and household income averaged $43,835 (*SD* = $33,757). The majority of husbands (58.8%) and wives (51.9%) had less than or equal to a high school diploma / GED; 11.6% of husbands and 16.2% of wives completed college.

Two trained interviewers visited couples in their homes to describe the IRB-approved study and obtain written informed consent from each participant. At baseline (T1), couples were visited in their homes by two interviewers who took spouses to separate areas to ensure privacy and orally administered self-report measures. After completing self-report measures individually, partners were reunited for 8-min videotaped discussions (including the problem-solving discussion presented in the current behavioral analyses). Interviewers returned at 9 months (T2) and 18 months (T3) and administered the same interview protocol. Following each interview, couples were debriefed and paid $75 for T1, $100 for T2, $125 for T3.

Measures

Relationship quality. Relationship satisfaction, defined as spouses' global sentiment towards the relationship, was assessed using a version of the Couple Satisfaction Index (CSI; Funk & Rogge, 2007). This version of the CSI is a 10-item measure of satisfaction, with higher scores indicating higher levels of satisfaction. The items assess global satisfaction (e.g., "I have a warm and comfortable relationship with my partner") and are rated on a 6-point Likert scale (0 = not at all true, 5 = completely true), with one item rated on a 7-point Likert scale (i.e., "All things considered how happy are you in your relationship," 0 = extremely unhappy, 6 = perfect). The possible range of scores on this scale is 0 to 51. Coefficient alpha exceeded .90 for husbands and wives across all waves of the study. Couple members were largely happy, with a mean satisfaction rating above 38 at all time points and SD between 7.91 and 10.93 at all time points.

Couple Communication. Cooperation and affiliation were rated continuously and concurrently by trained observers using a computer joystick, on scales ranging from -100 to +100 and ratings were sampled at a rate of twice per second, consistent with procedures used in previous studies (e.g., Sadler et al., 2009; Ross et al., 2017). Custom software, the Dual Axis Rating and Media Annotation package (Girard & Wright, 2017), presented coders with the videotaped interaction and a diagram of the coordinate grid. A moving dot corresponding with the current position of the joystick was displayed in the coordinate grid during the coding process to provide visual feedback on current ratings. Observers made ratings by moving the joystick continuously in accordance with the individual's statements, tone of voice, and nonverbal behaviors, in order to capture any change in cooperation and/or affiliation. Examples of cooperative behaviors included offering solutions to the stated problem and offering statements of agreement or support for the partner's argument, whereas examples of oppositional behaviors included making statements about the partner's responsibility for the problem and disagreeing with the partner. Examples of affiliative behaviors included maintaining eye contact and smiling as well as verbal communications such as expressing love, praising, or validating the partner. In contrast, examples of disaffiliative behaviors included avoiding eye contact, failing to respond when addressed, as well as verbal communications such as cold or contemptuous comments. Cooperation and affiliation were coded simultaneously given that many behaviors reflect blends of the two dimensions. Observers were instructed to maintain their most recent joystick position when interpersonal behavior remained unchanged, until the target person displayed an interpersonally meaningful behavior, unless the absence of behavior was itself interpersonally meaningful (e.g., failing to make eye contact or to respond to the other when addressed).

Twelve undergraduate research assistants were trained in the coding procedures, and roughly 6 trained observers were assigned to code a given video (i.e., 8-minute conflict interaction) each week, rating each couple member in the assigned video. Videos were viewed three times, once without rating, and then once again for each partner in the couple. Videos were presented in blocked-randomized order so that order of video and whether husband or wife was rated first differed across observer within a block. Reliabilities of each coded time-series, of which there were four per video (i.e., two interpersonal dimensions each for two couple members) were calculated each week and reviewed in weekly observer meetings. Following the recommendations of Girard and Cohn (2016), these meetings serve to combat observer "drift" (i.e., error because of decreased motivation or forgetting coding guidelines) by analyzing and standardizing the criteria that observers use to provide behavioral ratings. A small number of videos (25%) were rerated because of reliability falling below .60. As in Ross et al., 2017, we used an a priori rule to drop the single observer with the lowest agreement for each time-series (using a leave-one-out procedure), and then the moment-to-moment ratings from the remaining observers were averaged to create the final time-series composite. Inter-rater reliability was assessed using intraclass correlations (McGraw & Wong, 1996), which permit the inclusion or exclusion of between-rater variance as part of the error variance. A conservative "absolute ICC" coefficient was used for the present analyses which incorporates agreement on the level and relative patterning of rated behavior. The two dimensions had high inter-rater reliability (husbands' ICC's were .67 for affiliation and .72 for cooperation; wives' ICC's were .67 for affiliation and .73 for cooperation).

Analytic Plan

Latent Growth Curve Model of Aggregated Mean Levels of Behavior. Data were analyzed using latent growth curve modeling (LGCM). Consistent with the Actor Partner Interdependence Model (APIM; Kenney et al., 2006), husbands and wives were included in the same model to account for interdependence in the dyadic data and to test cross-spouse effects. Analyses were conducted in MPlus version 7.3 with Maximum Likelihood Robust (MLR) used as the estimator.

The first stage of the growth curve analyses involved specifying the trajectory of relationship satisfaction across time by modeling the values at each timepoint as a function of an intercept and slope representing time for husbands and for wives. The intercept represents levels of relationship satisfaction and the slope of time represents changes in satisfaction over time.

In a model testing main effects of aggregate levels of behavior on each dimension, husband and wife affiliation and cooperation were added to the model to predict intercepts and slopes of relationship satisfaction. In a subsequent model, the interaction of affiliation and cooperation for each spouse were added as predictors.

Markov Chain Analysis of Dyadic Sequences. In order to reduce noise and capture *change* of behaviors in discrete chunks over time, first, the continuous moment-to-moment data were smoothed using centered moving averages and a window size of 12 half seconds. This window size was selected because graphical analysis in combination with computing the Mean Absolute Deviation (i.e., |smoothed data – original data|/number of deviations computed) indicated that this window size showed strong fidelity to the original data, while also being large enough to allow for sufficient interpersonal behavior to be exchanged between partners. In general, given a time series $X = \{x_1, x_2, \ldots, x_n\}$ and a fixed window size k, the first moving average is computed as an unweighted mean of the first k values neighboring around the $\frac{1+k}{2}$th value. If k is even, this

center position is the largest integer that is smaller than $\frac{1+k}{2}$. The window continues to shift forward by one unit in time until its center position reaches the smallest integer that is larger than or equal to $n - \frac{k}{2}$. Using the smoothed data, first order derivatives were computed to represent rates of change along each dimension within that window of time, with sign indicating direction of change and coefficient indicating magnitude.

Next, we categorized behavioral changes within each window as positive or negative based on the direction of movement within each window (captured by the first order derivative) for each dimension. For example, if the first-order derivative value had a positive sign, the behavioral change was categorized as positive, indicating that the individual was increasing in their display of that behavior within the smoothed window of time. This categorical data included the following variables: positive change in affiliation; negative change in affiliation; positive change in cooperation; negative change in cooperation; positive change in affiliation *and* positive change in cooperation (depicted as Quadrant 1 in our coordinate grid used during coding procedures); negative change in affiliation *and* positive change in cooperation (Quadrant 2); negative change in affiliation *and* negative change in cooperation (Quadrant 3); positive change in affiliation *and* negative change in cooperation (Quadrant 4). Relying on these categorical data, we developed a contingency table that included counts of various antecedent-consequent behavior sequences of dyadic behavior, both based on the two dimensions (affiliation and cooperation) and the four quadrants that reflect blends of the two dimensions. We computed two sets of sequences when handling data based on dimensions and quadrants, one in which the husband served as the leader (i.e., the husband's data included a 1-window lag), and one in which the wife served as the leader. See Table 2 for sample sequence counts of dimension

behaviors and the corresponding data structure for one couple, and Table 7 for sample sequence counts of quadrant behaviors and the corresponding data structure.

Relying on the aforementioned sequence counts, we then used log-linear methods (Bakeman & Quera, 1995) while also employing a multilevel structure (Howe et al., 2005) to calculate indicators of behavioral tendencies and antecedent-consequent associations among behaviors using direct maximum likelihood estimation procedures (Grizzle, Starmer, & Koch, 1969). Consistent with the approach of Howe et al., 2005, data was structured such that information about row or column differences was included in a set of contrasts (i.e., design matrix) in order to compare the marginal totals. When studying reciprocity on each dimension, we specified two separate row contrasts (i.e., leader spouse increase vs. decrease in affiliation; leader spouse increase vs. decrease in cooperation); two separate column contrasts (i.e., follower spouse increase vs. decrease in affiliation; follower spouse increase vs. decrease in cooperation); and contrasts testing whether one spouse's actions influence the behavior of the other (positive reciprocation of affiliation vs. increased affiliation followed by decreased affiliation, negative reciprocation of affiliation vs. decreased affiliation followed by increased affiliation, positive reciprocation of cooperation vs. increased cooperation followed by decreased cooperation, negative reciprocation of cooperation vs. decreased cooperation followed by increased cooperation), corresponding to total behavior counts for each spouse (See Table 2). We used the same strategy when studying reciprocation on each quadrant (See Table 7). We tested the following antecedent-consequent sequences, once with husband as the leader and next with wife as the leader:

1) Positive Reciprocation of Affiliation: +Δ Affiliation followed by +Δ Affiliation
2) Positive Reciprocation of Cooperation: +Δ Cooperation followed by +Δ Cooperation

3) Negative Reciprocation of Affiliation: -Δ Affiliation followed by -Δ Affiliation
4) Negative Reciprocation of Cooperation: -Δ Cooperation followed by -Δ Cooperation
5) Reciprocation Quadrant 1:

   +Δ Affiliation and Cooperation followed by +Δ Affiliation and Cooperation
6) Reciprocation Quadrant 2:

   -Δ Affiliation and +Δ Cooperation followed by -Δ Affiliation and +Δ Cooperation
7) Reciprocation Quadrant 3:

   -Δ Affiliation and Cooperation followed by -Δ Affiliation and Cooperation
8) Reciprocation Quadrant 4:

   +Δ Affiliation and -Δ Cooperation followed by +Δ Affiliation and -Δ Cooperation

The multilevel approach yielded Empirical Bayesian random effects of log odds ratios for each antecedence-consequent sequence.

Duration of Sequence Analyses. Next, to calculate the duration of time (in windows) that couples engaged in each of the sequences listed above, the *R* "run-length encoding" procedure was used. We calculated the duration of every time each dyadic sequence occurred. A maximum duration for each sequence was computed for each couple. Two versions of these data were computed: one in which the husband was treated as the leader of the sequence (1 window lag) and one in which the wife was treated as the leader. Descriptive statistics for duration variables based on sequences of the two dimensions can be found in Table 3, while descriptive statistics for duration variables based on the behavioral quadrants can be found in Table 4.

Latent Growth Curve Model of Dyadic Sequences. Finally, we conducted two sets of latent growth curve models, one set relying on sequence variables related to dimensions of behavior and another set relying on sequence variables related to quadrants of behavior. Within

each set, we ran two models, one treating husband as the leader of sequences (1 window lag) and one treating wife as the leader of sequences, for a total of four LGCMs. Each latent growth curve model included Empirical Bayesian random effects of log odds ratios for each antecedence-consequent sequence as well as the maximum duration of sequence variables to predict intercepts and slopes of relationship satisfaction.

Results

Descriptive Statistics

We learn from the bivariate correlations shown in Table 1 that the two behavioral dimensions are highly correlated with one another (r = .75 for husbands $p < .01$; r = .72, $p < .01$ for wives). This is unsurprising given that the present conception of communication assumes that all behaviors are a blend of these two dimensions. Moreover, husbands and wives covaried moderately in their levels of displayed affiliation (r = .51, $p < .001$) and more strongly in their levels of displayed cooperation (r = .70, $p < .001$).

Greater displays of affiliation covaried with higher levels of relationship satisfaction concurrently for husbands and for wives (r = .28, $p < .01$ for husbands; r = .22, $p < .01$ for wives). For wives, higher levels of affiliation covaried with higher levels of relationship satisfaction at 9-month (r = .17, $p < .05$) and 18-month (r = .18, $p < .05$) follow-ups as well. Correlations between baseline affiliation and follow-up satisfaction were not significant for husbands.

Correlations between cooperation and relationship quality were far weaker. Husbands' behavioral displays of cooperation covaried with relationship satisfaction at baseline (r = .19, $p < .01$), and were uncorrelated with satisfaction at all other time points. Wives' levels of cooperation were uncorrelated with relationship satisfaction across all time points, lending

confidence to the argument that levels of agreement or disagreement during conflict may not hold strong implications for reports of relationship quality.

Latent Growth Curve Model of Relationship Satisfaction

A LGCM including husband and wife intercept and slope latent variables (but no predictors) shows that the model fit the data well, exceeding the minimum value of .95 for the comparative fit index (CFI) and achieving good fit (<.05) indexed by the root mean square error of approximation and standardized root mean square residual (<.08), in accordance with suggestions made by Hu and Bentler (1999) for a good model fit (CFI = .99, RMSEA = .04, SRMR = .06). Both spouses' intercept latent variables differed significantly from zero (M = 42.45, $p < .001$ for wives; M = 43.14, $p < .001$ for husbands), as did their slope latent variables (M = -1.93, $p < .001$ for wives; M = -1.18, $p < .001$ for husbands). Significant individual variability was found for both spouses' intercepts and slopes (wife intercept: $\sigma^2 = 56.09$, $p < .001$; wife slope: $\sigma^2 = 17.71$, $p < .01$; husband intercept: $\sigma^2 = 43.30$, $p < .001$; husband slope: $\sigma^2 = 7.32$, $p < .01$).

Main Effects of Affiliation and Cooperation

In the first latent growth curve model with predictors, husbands and wives' levels of cooperation and affiliation were included as predictors of husbands' and wives' intercepts and slopes of relationship satisfaction. Two significant findings emerged in this model. First, over and above all other effects, higher levels of husbands' affiliation were concurrently associated with higher levels of their own relationship quality ($\beta = .29$, $p < .05$). This effect was stable over time ($\beta = -.23$, *ns*), suggesting that husbands are more satisfied to the extent that they enact more affiliative behavior during conflict communication. Moreover, higher levels of husbands' affiliative behavior were also concurrently associated with greater relationship satisfaction for

wives (β = .37, $p < .01$), indicating that wives are more satisfied to the extent that their husbands are more affiliative during conflict communication. This effect was stable over time (β = .12, *ns*). In this initial model, wives' levels of affiliation were not significantly associated with their own or their husbands' relationship satisfaction concurrently (β = .19, *ns* for wives, β = .09, *ns* for husbands) or longitudinally (β = .07, *ns* for wives, β = .15, *ns* for husbands).

In contrast, spouses' levels of cooperation were not significantly associated with their own or their partners relationship satisfaction concurrently or longitudinally over and above the effects of affiliation (β = .10, *ns* husbands' satisfaction intercept on husbands' cooperation; β = .05, *ns* husbands' satisfaction slope on husbands' cooperation; β = -.21, *ns* husbands' satisfaction intercept on wives' cooperation; β = -.16, *ns* husbands' satisfaction slope on wives' cooperation; β = -14, *ns* wives' satisfaction intercept on husbands' cooperation; β = -.27, *ns* wives' satisfaction slope on husbands' cooperation; β = -.08, *ns* wives' satisfaction intercept on wives' cooperation; β = .02, *ns* wives' satisfaction slope on wives' cooperation).

In sum, levels of husband affiliative behavior distinguished between couples at different levels of relationship satisfaction over time and failed to predict the extent to which satisfaction declined for any given couple, while levels of cooperation did not distinguish between couples at different levels of relationship satisfaction nor did it predict changes in satisfaction over time.

Affiliation x Cooperation Interaction

The next model included two multiplicative interaction terms: husbands' affiliation x husbands' cooperation and wives' affiliation x wives' cooperation (See Figure 2). Main effects of husband affiliation on husband (β = .32, $p < .05$) and wife (β = .47, $p < .01$) relationship satisfaction intercepts remained significant in this model. Moreover, the effect of wife affiliation on wife relationship satisfaction intercept reached statistical significance in this model (β = .31, *p*

< .05). One significant second-order effect emerged. The interaction of husbands' affiliation and cooperation was concurrently associated with wives' relationship satisfaction, such that husbands' displays of high cooperation in combination with low husband affiliation were associated with lower levels of wives' relationship satisfaction (β = .25, $p < .05$). The multiplicative interaction of wives' behavior on the two dimensions was not significantly associated with wives' intercepts (β = .14, *ns*) or slopes of relationship satisfaction (β = -.26, *ns*). Neither the interaction of husbands' nor wives' affiliation and cooperation were significantly associated with husbands' satisfaction intercepts (husbands' behavior β = .09, *ns*; wives' behavior β = .02, *ns*) or slopes (husbands' behavior β = -.09, *ns*; wives' behavior β = .06, *ns*).

Simple slopes of cooperation at different levels of affiliation were calculated and tested versus zero for significance. Levels for affiliation were estimated at the mean and at one SD above and below the mean. Figure 3 illustrates the three simple slopes calculated, namely, husband cooperation at low husband affiliation (-1 SD), mean affiliation, and high affiliation (+1 SD). The line with a simple slope that differs significantly from zero is denoted with an asterisk. As shown in Figure 3, wives were more dissatisfied in their relationships to the extent that their husbands showed higher levels of cooperation with simultaneously low levels of affiliation (β = -.12, $p < .05$). All other simple slopes were nonsignificant, such that wives' satisfaction did not significantly differ when husbands demonstrated higher levels of cooperation with mean levels of affiliation (β = -.06, *ns*) or high levels of affiliation (β = .001, *ns*).

Dyadic Sequences of Affiliation and Cooperation

The next set of models first computed Empirical Bayesian random effects of log odds ratios for each antecedence-consequent sequence (i.e., reciprocity of positive changes in affiliation; reciprocity of positive changes in cooperation; reciprocity of negative changes in

affiliation; reciprocity of negative changes in cooperation). This was done twice; once treating husbands as the leader of the sequence (husband data lagged 1 window) and once treating wives as the leader of the sequence. Means and variances for random effects are shown in Table 5. The ratio of the mean to its standard error, distributed as z, was greater than 1.96 for all antecedent-consequent sequences (β_{5k}, β_{6k}, β_{7k}, and β_{8k}), indicating that the effects differed from zero. Ratios of variances to their standard errors were greater than 1.96 for all sequences as well, indicating that there was sufficient variability in this sample of couples on all random effects. These findings confirm the need for random effect modeling.

The next set of latent growth curve models relied on the Empirical Bayesian random effects of log odds ratios for each antecedence-consequent sequence (i.e., positive reciprocity of affiliation; positive reciprocity of cooperation; negative reciprocity of affiliation; negative reciprocity of cooperation) as well as variables reflecting each couples' maximum duration of each sequence (i.e., duration of positive reciprocity of affiliation; duration of positive reciprocity of cooperation; duration of negative reciprocity of affiliation; duration of negative reciprocity of cooperation) to predict intercepts and slopes of relationship satisfaction. Results are shown in Table 6. A number of significant effects emerged. A figure for a sample couple with relatively low satisfaction intercepts and slopes is included to show how affiliative and cooperative reciprocity can each unfold over time (see Figure 4).

Markov Chain Log Odds Ratio Random Effects for Affiliation and Cooperation. As shown in Table 6, results revealed that greater tendencies to engage in positive reciprocity on the affiliation dimension (i.e., wives' positive change in affiliation followed by husbands' positive change in affiliation at the next window) predicted more positive trajectories of wives' satisfaction over time ($\beta = .28$, $p < .05$). No significant effects emerged for positive reciprocity of

cooperation. All other effects of log odds ratios of antecedent-consequent sequences were nonsignificant.

Dyadic Sequence Duration Effects for Affiliation and Cooperation. Also shown in Table 6, when analyses treated wives as leaders of sequences of negative reciprocity on the affiliation dimension, sequences that were longer in duration led to steeper declines in wives' satisfaction over time ($\beta = -.30$, $p < .01$). All other effects were nonsignificant. Notably, no significant effects emerged for duration of negative reciprocity of opposition. No significant effects of duration of positive reciprocity of either dimension on satisfaction (intercepts and slopes) emerged.

Dyadic Sequences Within Specified Quadrants

The next set of models computed Bayesian random effects of log odds ratios for antecedence-consequent sequences reflecting reciprocity of each quadrant (i.e., reciprocity of Quadrant 1 behavioral increases; Reciprocity of Quadrant 2 behavioral increases; Reciprocity of Quadrant 3 behavioral increases; Reciprocity of Quadrant 4 behavioral increases). As before, this was done twice; once treating husbands as the leader of the sequence (husband data lagged 1 window) and once treating wives as the leader of the sequence. Means and variances for random effects are shown in Table 8. Here, the ratio of the mean to its standard error, distributed as z, was greater than 1.96 for the antecedent-consequent sequences of Quadrant 1 reciprocation and Quadrant 3 reciprocation (β_{9k}, β_{11k}), indicating that these effects differed from zero. Ratios of variances to their standard errors were greater than 1.96 for these two sequences as well, indicating that there is sufficient variability in this sample of couples on these random effects. The same was not true for Quadrant 2 and Quadrant 4 reciprocation sequences. The ratio of the mean to its standard error, distributed as z, was less than 1.96 for these two antecedent-

consequent sequences, suggesting that these random effects did not significantly differ from zero.

The following set of analyses relied on the Empirical Bayesian random effects of log odds ratios for each antecedence-consequent sequence (i.e., Quadrant 1 reciprocity; Quadrant 2 reciprocity; Quadrant 3 reciprocity; Quadrant 4 reciprocity) as well as maximum duration of sequence variables to predict intercepts and slopes of relationship satisfaction in the latent growth curve model (i.e., duration of Quadrant 1 reciprocity; duration of Quadrant 2 reciprocity; duration of Quadrant 3 reciprocity; duration of Quadrant 4 reciprocity). Results are shown in Table 9. Given that random effects for Quadrant 2 and Quadrant 4 reciprocity did not reach statistical significance, we did not expect to find significant effects of these sequences, or of their durations, on intercept and slopes of relationship satisfaction. However, these variables were still included as covariates in the model. A number of significant effects emerged.

Markov Chain Log Odds Ratio Random Effects for Quadrant 1 Reciprocation. As seen in Table 9, when analyses treated husbands as initiators of the sequence, the reciprocation of increased affiliation and increased cooperation (Quadrant 1) was associated with higher levels of satisfaction for husbands ($\beta = .28$, $p < .01$). This effect was stable over time ($\beta = .15$, *ns*). This effect did not reach statistical significance when wives were treated as the leaders of the sequence.

Duration of Quadrant 1 Reciprocation. When wives were treated as leaders of the sequence, longer sequences of reciprocation of increased affiliation and increased cooperation (Quadrant 1) were associated with higher levels of satisfaction for wives ($\beta = .18$, $p < .05$) but not husbands ($\beta = .01$, *ns*). No other significant effects emerged.

Markov Chain Log Odds Ratio Random Effects for Quadrant 3 Reciprocation. When husbands were treated as initiators of the sequence, the reciprocation of decreased affiliation and decreased cooperation (Quadrant 3) was associated with steeper declines in satisfaction for wives over time ($\beta = -.30$, $p < .01$). All other effects were nonsignificant.

Duration of Quadrant 3 Reciprocation. Analyses treating husbands as leaders of the sequence revealed that when reciprocal sequences of decreased affiliation and decreased cooperation (Quadrant 3) were longer in duration, husbands were more dissatisfied with their relationships ($\beta = -.21$, $p < .05$). These effects were stable over time ($\beta = .06$, *ns*). No other significant findings emerged.

Discussion

Communication has been considered one of the most salient metrics of relationship functioning for decades, but a growing body of contradictory and null findings imply that the traditional characterization of behaviors as positive or negative may be failing this rich, nuanced phenomenon. In the current study, we propose a new framework for studying communication that relies on two distinct, but often co-occurring dimensions of behavior: cooperation and affiliation. In an effort to disentangle what makes communication more or less constructive in promoting relationship wellbeing, we asserted that while cooperative behavior is more task-focused, affiliative behavior is more relationship focused, and should therefore be the salient predictor of relationship quality. We expected that cooperation should only affect relationship quality to the extent that it is affiliative or disaffiliative. Therefore, a blend of cooperative and affiliative behavior should serve a positive interpersonal function, while a blend of cooperative and disaffiliative behavior may not; a blend of oppositional, affiliative behavior may have no consequences for relationship wellbeing while oppositional, disaffiliative behavior may be

especially damaging. Because communication occurs as a dyadic process unfolding over time between partners, we first tested our ideas with mean-level data aggregated across the entire interaction, but also took advantage of continuous moment-to-moment ratings to examine how dyadic time-based sequences relying on our two proposed dimensions predict relationship satisfaction cross-sectionally and longitudinally. As expected, affiliation and its interaction with cooperation emerged as significant predictors of relationship satisfaction. At the dyadic level, we expected that the duration and frequency of affiliative and cooperative-affiliative reciprocity to be diagnostic of relationship wellbeing initially and protect against deterioration over time, while anticipating that disaffiliative and disaffiliative-oppositional reciprocity would have more adverse effects on relationship quality at baseline and over time.

We tested these ideas with a sample of 216 newlywed couples with a great deal of ethnic and socioeconomic diversity in an effort to adequately study the development of marriage over time and to establish findings that are generalizable to all segments of the population, rather than solely white, middle-class, college-educated couples. Relying on three assessments of relationship satisfaction, the current work tested how behavior is diagnostic of relationship functioning and how communication processes are associated with changes in satisfaction over time. We relied on continuous, moment-to-moment observational data, which afforded us a more reliable estimate of mean-level global behavior used in the first set of analyses and allowed us to study dyadic, temporal sequences in the second set of analyses. With the continuous observational data, we tested how *changes* in affiliative and cooperative behavior are reciprocated and amplified between partners as well as how the duration of dyadic sequential patterns can impact relationship wellbeing.

Key Findings and Implications

Effects of Aggregated Mean Levels of Affiliation and Cooperation. When studying global levels of affiliation and cooperation, we find broad evidence that affiliation is a salient predictor of relationship quality cross-sectionally while cooperation is not. Analyses of aggregated mean levels of behavior reveal that, despite correlations in the expected directions for both dimensions, affiliation has independent effects on satisfaction over and above cooperation, while cooperation effects fall short of significance. Furthermore, there is some evidence of an interaction between affiliation and cooperation, such that cooperation is only linked with relationship satisfaction to the extent that it is affiliative or disaffiliative. This interaction also suggests that cooperation can actually be harmful for relationships when affiliation is low, which may help to explain surprising findings in the literature demonstrating that good behaviors can sometimes be harmful. Cohan and Bradbury (1997), for example, revealed, surprisingly, that behaviors like agreement could be linked to relationship deterioration over time. The present set of findings may offer context to this counterintuitive finding, suggesting that agreement may require affiliation in order to promote relationship satisfaction among partners. Moreover, when paired with low levels of affiliation or outright disaffiliation, agreement may well be detrimental to relationships, but such possibilities are difficult to disentangle empirically unless task-oriented and relationship-oriented behaviors are assessed separately.

Taken together, analyses of global levels of behavior, based on means aggregated over the course of the entire interaction, indicate that affiliation and its combination with cooperation is associated with relationship satisfaction cross-sectionally; however, these mean-level analyses fail to account for variability over time, which is troubling given the wide-held assumption that communication is a critical determinant of relationship satisfaction trajectories (e.g., Karney &

Bradbury, 1995). The lack of significant slope effects may be due to the fact that studying behavior at an individual, static level does not fully capture the phenomenon that occurs during couple communication. Studying behavior as dyadic and dynamic, however, may more closely align the measurement with the true experience of couples during communication, strengthening our ability to test associations between behavior and relationship outcomes over time.

Effects of Dyadic Sequences of Affiliation and Cooperation. With continuous ratings of behavior measured simultaneously on both dimensions, we were able to study the stream of individual and dyadic behavior over time, based on each individual behavioral dimension and the blend of the two. We extend ideas of reciprocity advanced by Margolin and Wampold (1981) in a number of ways: 1) We studied reciprocity of affiliation, cooperation, and the blend of the two in an effort to disentangle which elements of positive or negative behavior are most potent for relationship quality when reciprocated among partners, 2) We investigated how *changes* in one partner's level of affiliation, cooperation, and the blend of the two elicit similar *changes* in their spouse's behaviors, allowing us to make stronger causal inferences about one spouse's behavior leading to the changes in the other's, while also illuminating how spousal reciprocity as well as escalation predict relationship quality over time. 3) We explored how the duration of these reciprocity sequences predict relationship quality over time, clarifying that it is not only reciprocity that matters for relationship wellbeing but also the degree to which couples become stuck, for better or for worse, in specific reciprocal patterns. All in all, the pattern of results derived from these sequential analyses offered support for our proposal that there is a distinction to be made in the definition of positive and negative reciprocity, such that the reciprocation of certain "negative" behaviors is more harmful than the reciprocation of others. Specifically, while oppositional reciprocity does not have an impact on relationship quality, disaffiliative reciprocity

and disaffiliative-oppositional reciprocity appear to have destructive consequences for relationship wellbeing.

The sequential analyses relying on the two discrete dimensions of CODA (affiliation and cooperation, treated separately) offer some evidence that reciprocity of affiliative behavior, but not cooperative behavior, has meaningful consequences for relationship satisfaction. Specifically, wife-led positive, affiliative reciprocity predicted more positive trajectories for wives' satisfaction over time. Moreover, longer durations of disaffiliative reciprocity predicted steeper declines in wives' satisfaction over time. Taken together, these findings suggest that wives experience better relationship outcomes to the extent that they and their partners engage in high levels of affiliative reciprocity and limit their disaffiliative reciprocity.

Studying reciprocity based on the blends of the two dimensions, differentiated by quadrant, further supported the notion that reciprocity of behaviors reflecting opposition accompanied by affiliation was of little importance, while reciprocity of opposition that was also disaffiliative was detrimental to marriages. Specifically, longer durations of disaffiliative-oppositional reciprocity (Quadrant 3) were diagnostic of greater dissatisfaction among husbands initially, and greater tendencies to engage in this reciprocal pattern were associated with steeper declines in satisfaction for wives over time. Offering further support for the importance of affiliation, quadrant-based analyses also suggested that husband-initiated affiliative-cooperative reciprocity (Quadrant 1) covaried with higher levels of husband satisfaction, and longer durations of this form of reciprocity when led by wives were associated with higher levels of wife satisfaction.

Common Themes Across Global and Sequential Analyses. Taken together these results help to clarify the destructive or constructive nature of communication by revealing that the effects of agreement and disagreement on relationship outcomes depend on the extent to which they are

accompanied by behaviors that promote closeness among partners. At the individual, global level (based on aggregated means), we find that affiliation has robust links with relationship satisfaction, while cooperation does not, suggesting that affiliation is the component of communication that is critical for relationship wellbeing. Similarly, at the dyadic, temporal level, reciprocity effects again support the assertion that affiliation is a particularly salient determinant of relationship wellbeing. Another important pattern emerges from our results: individual, global levels of behavior only predicted intercept effects of relationship satisfaction, while dyadic sequences of behavior predicted slope effects. This pattern suggests that dynamic couple-level behavioral processes are critical for understanding change in relationship wellbeing over time and may help explain why some observational studies have struggled to generate longitudinal effects (e.g., Lavner, Karney, Bradbury, 2016) and why studies that have generated longitudinal effects demonstrate that expressions of emotion that draw partners together (e.g., humor, interest, affection) can offset the adverse effects of deficient communication skills (Johnson et al., 2005) . These results have significant implications for treatment, suggesting that rather than teaching couples to solve problems and avoid blaming or demanding change, we should teach couples to approach conflict with the goal of maintaining engagement and connectedness to the partner even when expressing disagreement.

Limitations and Future Directions

Although the large sample size, longitudinal data, and methodologically rigorous observational measurement and analysis of behavior help strengthen our conclusions, this study is not without limitations. First, despite success in recruiting an ethnically and socioeconomically diverse sample, our sample does not include older couples or same-sex couples, thus limiting generalizability to these demographics. Second, despite the promise of this new observational

coding system evidenced by our findings, the current work cannot make claims about the incremental validity of this coding system over others. Without a corresponding set of behavioral data captured by a well-validated, existing coding system we are unable to compare our results to those obtained with traditional observational measurement in this sample. Coding behavioral data with the current system, a pre-existing macro-coding system, and a pre-existing micro-coding system would allow scholars to make direct comparisons between the different methodologies and to make stronger claims about the relative merits of each system. Third, although we find substantial evidence that affiliation is a robust predictor of relationship health while cooperation is less salient for relationship outcomes, it may be the case that there are other key dimensions of communication that were not investigated in the current work. Future research may benefit from exploring other salient dimensions of communication using similar methods to those employed here.

Conclusion

By testing the relationship-focused and task-focused dimensions of behavior, the current work investigated the function of communication and clarified the factors that make communication constructive or destructive. The current findings reveal that affiliation, on its own and in combination with cooperation, is meaningfully linked with more positive relationship outcomes, while cooperation is only salient for relationship quality to the extent that it is affiliative or disaffiliative. These results support the conclusion that couple communication functions to promote closeness and connection among partners, and therefore relationship-focused behaviors are the interpersonal ingredient that links couple communication to relationship outcomes.

References

Bakan, D (1966). The duality of human existence. Chicago: Rand McNally.

Bandura, A., & Walters, R.H. (1977). *Social learning theory* (Vol. 1). Englewood Cliffs, NJ: Prentice hall.

Bodenmann, G., Bradbury, T. N., & Pihet, S. (2008). Relative contributions of treatment-related changes in communication skills and dyadic coping skills to the longitudinal course of marriage in the framework of marital distress prevention. *Journal of Divorce & Remarriage*, *50*(1), 1-21.

Bradbury, T. N., & Karney, B. R. (1993). Longitudinal study of marital interaction and dysfunction: Review and analysis. *Clinical Psychology Review*, *13*(1), 15-27.

Buss, D. M. (1996). Paternity uncertainty and the complex repertoire of human mating strategies.

Cohan, C. L., & Bradbury, T. N. (1997). Negative life events, marital interaction, and the longitudinal course of newlywed marriage. *Journal of Personality and Social Psychology*, *73*(1), 114.

Filsinger, E. E., & Thoma, S. J. (1988). Behavioral antecedents of relationship stability and adjustment: A five-year longitudinal study. *Journal of Marriage and the Family*, *50*(3), 785-795.

Funk, J. L., & Rogge, R. D. (2007). Testing the ruler with item response theory: increasing precision of measurement for relationship satisfaction with the Couples Satisfaction Index. *Journal of Family Psychology*, *21*(4), 572.

Girard, J. M., & Cohn, J. F. (2016). A primer on observational measurement. *Assessment*, *23*(4), 404-413.

Girard, J. M., & Wright, A. G. C. (2017). DARMA: Dual axis rating and media annotation. *Behavior research methods, 50,* 1-8.

Gottman, J. M. (1998). Psychology and the study of marital processes. *Annual Review of Psychology, 49,* 169–197.

Gottman, J. M., & Krokoff, L. J. (1989). Marital interaction and satisfaction: A longitudinal view. *Journal of Consulting and Clinical Psychology, 57,* 47–52.

Hahlweg, K., Revenstorf, D., & Schindler, L. (1984). Effects of behavioral marital therapy on couples' communication and problem-solving skills. *Journal of Consulting and Clinical Psychology, 52*(4), 553-566.

Heavey, C. L., Layne, C., & Christensen, A. (1993). Gender and conflict structure in marital interaction: A replication and extension. *Journal of consulting and clinical psychology, 61*(1), 16-27.

Howe, G. W., Dagne, G., & Brown, C. H. (2005). Multilevel Methods for Modeling Observed Sequences of Family Interaction. *Journal of Family Psychology, 19*(1), 72–85.

Jacobson, N. S., & Margolin, G. (1979). *Marital therapy: Strategies based on social learning and behavior exchange principles.* New York, New York: Brunner/Mazel.

Karney, B. R., & Bradbury, T. N. (1995). The longitudinal course of marital quality and stability: A review of theory, methods, and research. *Psychological Bulletin, 118,* 3-34.

Karney, B.R., & Bradbury, T.N. (1997). Neuroticism, marital interaction, and the trajectory of marital satisfaction. *Journal of Personality and Social Psychology, 72,* 1075-1092.

Kiecolt-Glaser, J. K., Bane, C., Glaser, R., & Malarkey, W. B. (2003). Love, marriage, and divorce: newlyweds' stress hormones foreshadow relationship changes. *Journal of consulting and clinical psychology, 71*(1), 176-188.

Kiesler, D. J. (1983). The 1982 Interpersonal Circle: A taxonomy for complementarity in human transactions. *Psychological Review, 90,* 185–214.

Lavner, J. A., Karney, B. R., & Bradbury, T. N. (2014). Relationship problems over the early years of marriage: Stability or change? *Journal of Family Psychology, 28*(6), 979.

Lavner, J. A., Karney, B. R., & Bradbury, T. N. (2016). Does couples' communication predict marital satisfaction, or does marital satisfaction predict communication? *Journal of Marriage and Family, 78*(3), 680-694.

Leary, T. (1957). *Interpersonal diagnosis of personality*. New York, NY: Ronald Press.

Levenson, R. W., & Gottman, J. M. (1983). Marital interaction: physiological linkage and affective exchange. *Journal of personality and social psychology, 45*(3), 587-597.

Lizdek, I., Sadler, P., Woody, E., Ethier, N., & Malet, G. (2012). Capturing the stream of behavior: A computer-joystick method for coding interpersonal behavior continuously over time. *Social Science Computer Review, 30*(4), 513-521.

Luxen, M. F. (2005). Gender differences in dominance and affiliation during a demanding interaction. *The Journal of Psychology, 139*(4), 331-347.

Margolin, G., & Wampold, B. E. (1981). Sequential analysis of conflict and accord in distressed and nondistressed marital partners. *Journal of Consulting and Clinical Psychology, 49,* 554–567.

McClelland, D. C. (1987). Human motivation. CUP Archive.

McCrae, R. R., & Costa, P. T. (1989). The structure of interpersonal traits: Wiggins's circumplex and the five-factor model. *Journal of personality and social psychology, 56*(4), 586-595.

McGraw, K. O., & Wong, S. P. (1996). Forming inferences about some intraclass correlation coefficients. *Psychological Methods, 1*(1), 30–46.

Melby, J., Conger, R., Book, R., Rueter, M., Lucy, L., Repinski, D., . . .Scaramella, L. (1998). The Iowa Family Interaction Rating Scales (5th ed.). Unpublished manuscript, Institute for Social and Behavioral Research, Iowa State University, Ames, Iowa.

Overall, N. C., Fletcher, G. J., Simpson, J. A., & Sibley, C. G. (2009). Regulating partners in intimate relationships: The costs and benefits of different communication strategies. *Journal of Personality and Social Psychology, 96*(3), 620-639.

Overall, N. C., & McNulty, J. K. (2017). What type of communication during conflict is beneficial for intimate relationships? *Current opinion in psychology, 13*, 1-5.

Reis, H.T., & Shaver, P. (1988). Intimacy as an interpersonal process. In Duck, S. (Ed.), *Handbook of Personal Relationships: Theory, Research and Interventions* (pp. 367-389). Chichester, England: Wiley.

Revenstorf, D., Vogel, B., Wegener, C., Hahlweg, K., & Schindler, L. (1980). Escalation phenomena in interaction sequences: An empirical comparison of distressed and non-distressed couples. *Behaviour Analysis and Modifications*, *2*, 97-116.

Roddy, M. K., Nowlan, K. M., Doss, B. D., & Christensen, A. (2016). Integrative behavioral couple therapy: Theoretical background, empirical research, and dissemination. *Family process, 55*(3), 408-422.

Rogge, R. M., & Bradbury, T. N. (1999). Recent advances in the prediction of marital outcomes. In R. Berger & M. T. Hannah (Eds.), *Preventive approaches in couples therapy* (pp. 331-360). Philadelphia, PA: Brunner/Mazel.

Sadler P, Ethier N, Gunn GR, Duong D, Woody E (2009). Are we on the same wavelength? Interpersonal complementarity as shared cyclical patterns during interactions. *Journal of Personality and Social Psychology, 97*(6), 1005–1020.

Schaap, C. (1982). *Communication and adjustment in marriage.* Lisse, The Netherlands: Swets & Feitlinger.

Schilling, E. A., Baucom, D. H., Burnett, C. K., Allen, E. S., & Ragland, L. (2003). Altering the course of marriage: The effect of PREP communication skills acquisition on couples' risk of becoming maritally distressed. *Journal of Family Psychology, 17*(1), 41-53.

Stanley, S. M., Markman, H. J., & Whitton, S. W. (2002). Communication, conflict, and commitment: Insights on the foundations of relationship success from a national survey. *Family process, 41*(4), 659-675.

Stanley, S. M., Rhoades, G. K., Olmos-Gallo, P. A., & Markman, H. J. (2007). Mechanisms of change in a cognitive behavioral couples prevention program: Does being naughty or nice matter? *Prevention Science, 8*(3), 227-239.

Sullivan, H. S. (1953). *The interpersonal theory of psychiatry.* New York, NY: WW Norton.

Thibaut, J. W., & Kelley, H. H. (1959). *The social psychology of groups.* New York, NY: Wiley.

Wiggins, J. S. (1979). A psychological taxonomy of trait descriptive terms: The interpersonal domain. *Journal of Personality and Social Psychology, 37*, 395–412.

Wile, D. B. (1988). *After the honeymoon: How conflict can improve your relationship*. New York, NY: Wiley.

Williamson, H. C., Altman, N., Hsueh, J., & Bradbury, T. N. (2016). Effects of relationship education on couple communication and satisfaction: A randomized controlled trial with low-income couples. *Journal of Consulting and Clinical Psychology, 84,* 156-166.

Winston, P., Angel, R., Burton, L., Chase-Lansdale, P. L., Cherlin, A., Moffit, R., et al. (1999). *Welfare, children and families: A three-city study: Overview and design report.* Baltimore: Johns Hopkins University.

Woodin, E. M. (2011). A two-dimensional approach to relationship conflict: Meta-analytic findings. *Journal of Family Psychology, 25*(3), 325-335.

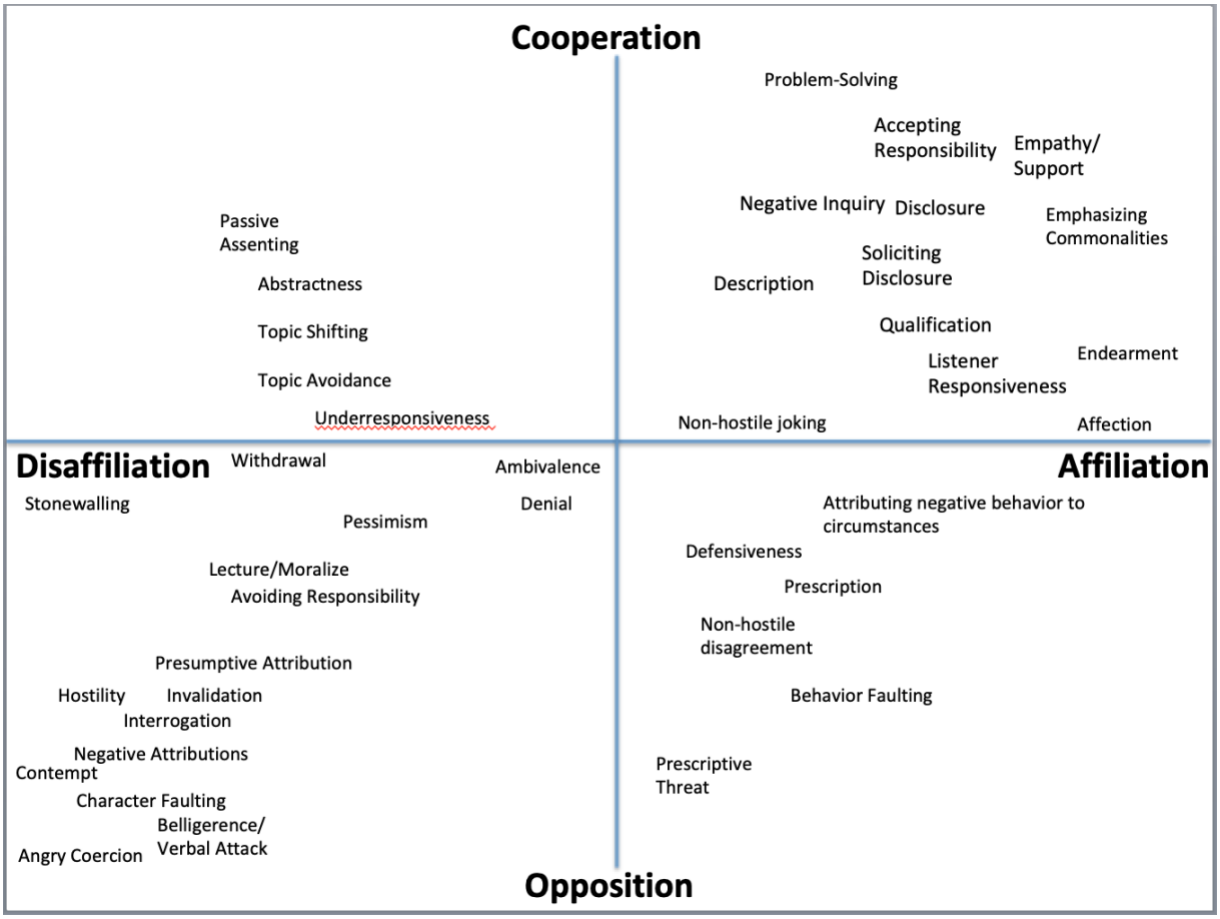

Figure 1. Diagram of coordinate grid organizing behaviors. The model maps behavior as variables falling at various points organized around the two principle axes of cooperation and affiliation. Discrete behaviors populating the coordinate grid are codes typically seen in traditional observational coding systems (e.g., IFIRS; Melby et al., 1998). These locations are not empirically determined but serve to illustrate how traditional behavioral codes map onto to the novel framework.

Table 1. *Correlations and Descriptive Statistics for All Variables in Model*

Variable	**1**	**2**	**3**	**4**	**5**	***Mean***	***SD***
(1) Affiliation	**.51*** **	.72***	.22**	.17*	.18*	16.26	17.99
(2) Cooperation	.75**	**.70*** **	.12	.05	.08	3.21	26.09
(3) T1 Satisfaction	.28**	.19**	**.50*** **	.52**	.34**	42.05	7.91
(4) T2 Satisfaction	.11	.06	.60	**.40*** **	.62**	41.51	8.89
(5) T3 Satisfaction	.10	.09	.58	.73	**.44*** **	38.96	10.93
Mean	11.7	3.57	43.05	42.44	40.71		
SD	22.02	27.65	7.91	8.61	9.75		

Note. N = 216 wives and 216 husbands. Results for wives are above the diagonal, and results for husbands are below the diagonal. Correlations between husbands' and wives' scores are on the diagonal, in bold.
** p<.05, ** p<.01, *** p<.001.*

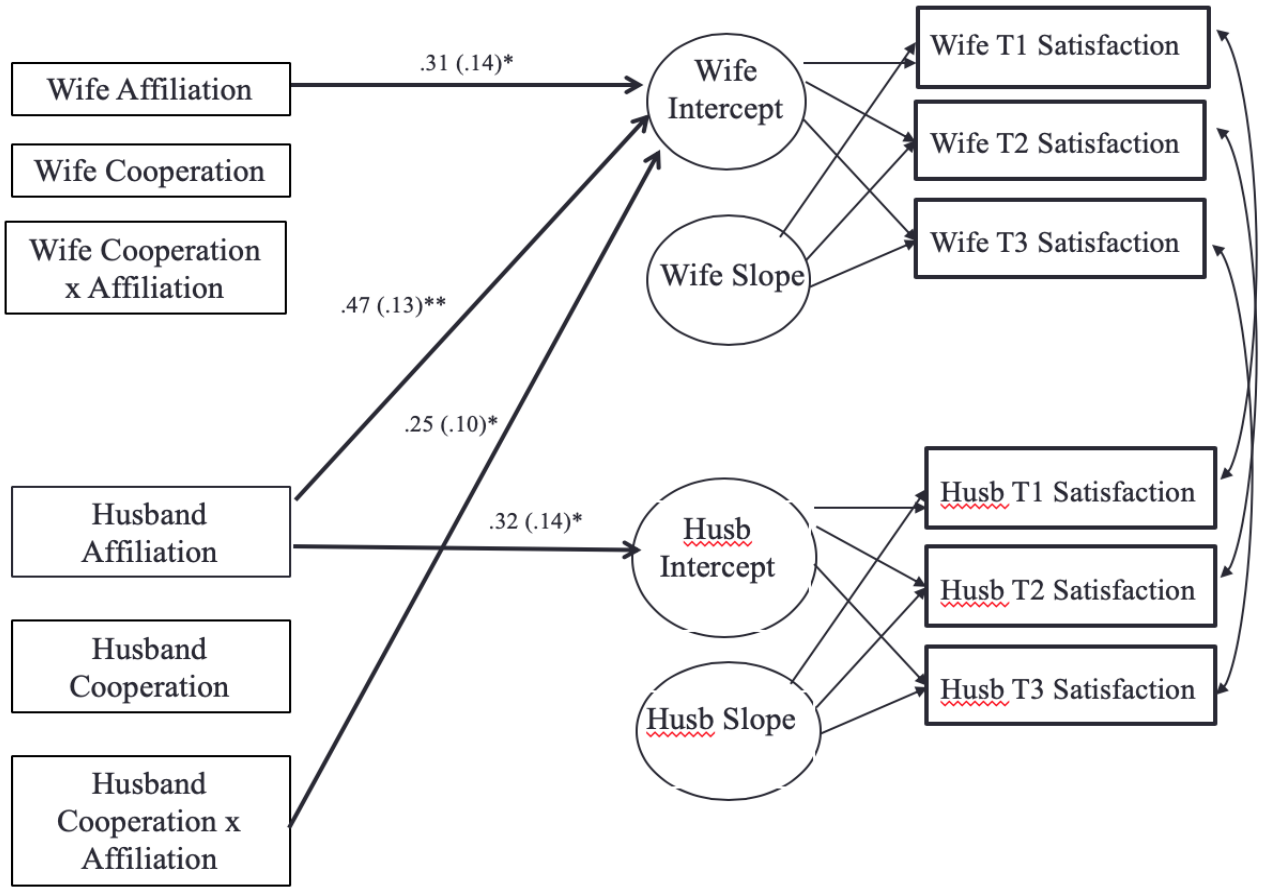

Figure 2. Latent Growth Curve Model of affiliation and cooperation predicting husbands' and wives' relationship satisfaction intercepts and slopes. Only significant paths are shown. Standardized estimates are presented. RMSEA = .00, SRMR = .04.
*Note. * p<.05, ** p<.01, *** p<.001.*

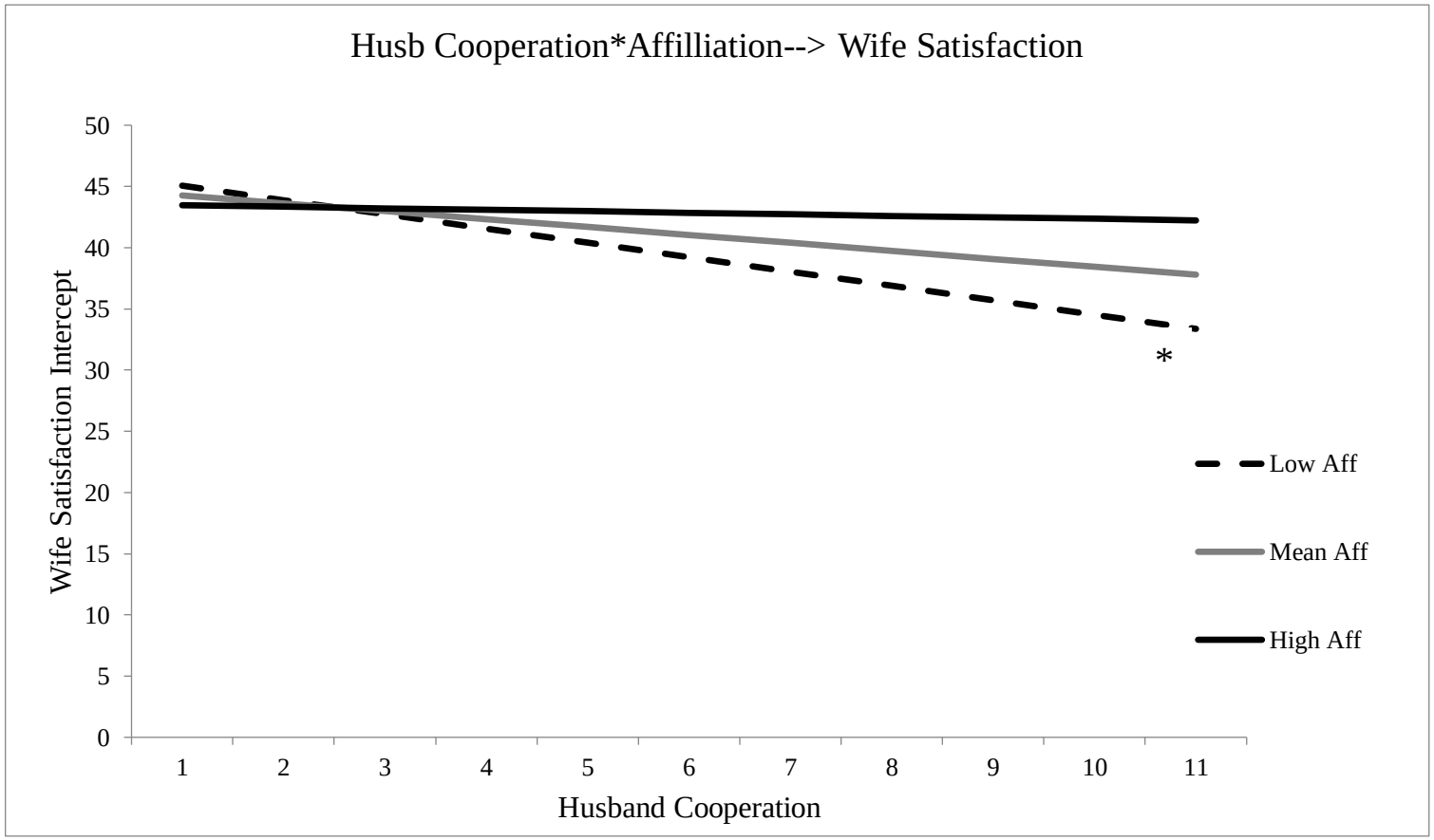

Figure 3. Interaction of husband affiliation and cooperation predicting wives' wives' relationship satisfaction intercept. Husbands' low affiliation (-1 SD) is the only significant simple slope, denoted with an asterisk. *Note. * p<.05, ** p<.01, *** p<.001.*

Table 2. Sample Sequence Counts and Data Structure for a Single Couple Based on Dimensions

	Wife Consequent Behavior				
Husband Antecedent Behavior	+Δ Affiliation	-Δ Affiliation	+Δ Cooperation	-Δ Cooperation	Total
+Δ Affiliation	10	7	5	6	28
-Δ Affiliation	3	6	9	2	20
+Δ Cooperation	8	7	10	6	31
-Δ Cooperation	5	5	7	10	27
Total	26	25	31	24	

CSID	CEL	CNT	TOT	R1	R2	C1	C2	A1	A2	A3	A4
1	11	28	368	1	0	1	0	0	0	1	0
1	12	27	368	1	0	-1	0	0	0	-1	0
1	13	27	368	1	0	0	1	0	0	0	0
1	14	28	368	1	0	0	-1	0	0	0	0
1	21	13	368	-1	0	1	0	-1	0	0	0
1	22	24	368	-1	0	-1	0	1	0	0	0
1	23	14	368	-1	0	0	1	0	0	0	0
1	24	23	368	-1	0	0	-1	0	0	0	0
1	31	23	368	0	1	1	0	0	0	0	0
1	32	28	368	0	1	-1	0	0	0	0	0
1	33	21	368	0	1	0	1	0	0	0	1
1	34	30	368	0	1	0	-1	0	0	0	-1
1	41	18	368	0	-1	1	0	0	0	0	0
1	42	23	368	0	-1	-1	0	0	0	0	0
1	43	20	368	0	-1	0	1	0	-1	0	0
1	44	21	368	0	-1	0	-1	0	1	0	0

Note. CSID = couple ID number; CEL = cell ID number (row followed by column); CNT = cell count; R1-R2 = row contrast vectors for husband +Δ Affiliation vs. -Δ Affiliation, +Δ Cooperation vs. -Δ Cooperation; C1-C2 = column contrast vectors for wife +Δ Affiliation vs. -Δ Affiliation, +Δ Cooperation vs. -Δ Cooperation; A1 = association contrast vector for negative reciprocation of -Δ Affiliation vs. Editing (-Δ Husb Affiliation followed by +Δ Wife Affiliation); A2 = association contrast vector for negative reciprocation of -Δ Cooperation vs. Editing (-Δ Husb Cooperation followed by +Δ Wife Cooperation); A3 = association contrast vector for positive reciprocation of +Δ Affiliation vs. Negative Reactivity (+Δ Husb Affiliation followed by -Δ Wife Affiliation); A4 = association contrast vector for positive reciprocation of +Δ Cooperation vs. Negative Reactivity (+Δ Husb Cooperation followed by -Δ Wife Cooperation).

Descriptive Statistics for Maximum Duration of Reciprocity Dimension Sequences

Variable	M	SD	Minimum	Maximum
Husband Lead				
Max Duration of Positive Reciprocity- Affiliation	4.53	1.54	2.00	9.00
Max Duration of Negative Reciprocity- Affiliation	4.46	1.48	2.00	11.00
Max Duration of Positive Reciprocity- Cooperation	5.16	1.77	2.00	11.00
Max Duration of Negative Reciprocity- Cooperation	4.50	1.36	2.00	9.00
Wife Lead				
Max Duration of Positive Reciprocity- Affiliation	4.58	1.47	2.00	10.00
Max Duration of Negative Reciprocity- Affiliation	4.47	1.45	2.00	10.00
Max Duration of Positive Reciprocity- Cooperation	5.07	1.79	2.00	12.00
Max Duration of Negative Reciprocity- Cooperation	4.48	1.44	2.00	11.00

Note. Duration of sequences was measured in number of 12-half-second windows.

Table 4. Descriptive Statistics for Maximum Duration of Reciprocity Quadrant Sequences

Variable	Mean	Std. Deviation	Minimum	Maximum
Husband Lead				
Max Duration of Quadrant 1 Reciprocity	3.15	1.31	1.00	8.00
Max Duration of Quadrant 2 Reciprocity	1.51	.66	.00	4.00
Max Duration of Quadrant 3 Reciprocity	2.62	1.12	1.00	8.00
Max Duration of Quadrant 4 Reciprocity	1.36	.77	.00	4.00
Wife Lead				
Max Duration of Quadrant 1 Reciprocity	3.05	1.30	1.00	8.00
Max Duration of Quadrant 2 Reciprocity	1.50	.72	.00	3.00
Max Duration of Quadrant 3 Reciprocity	2.67	1.07	.00	8.00
Max Duration of Quadrant 4 Reciprocity	1.39	.76	.00	4.00

Note. Duration of sequences was measured in number of 12-half-second windows.

Table 5. Means and Variances for Random Effects for reciprocity of affiliation and cooperation

Parameter	Effect	M	SE of mean	M/SE	Variance	SE of Variance	Variance/SE
Husband Lead							
BETA5k	Neg Reciprocity Disaffiliation	.005	.001	5.29	.003	.001	3.14
BETA6k	Neg Reciprocity Opposition	.005	.001	5.23	.002	.001	2.36
BETA7k	Pos Reciprocity Affiliation	.003	.001	3.04	.002	.001	2.52
BETA8k	Pos Reciprocity Cooperation	.007	.001	7.23	.004	.001	4.03
Wife Lead							
BETA5k	Neg Reciprocity Disaffiliation	.005	.001	4.37	.003	.001	3.81
BETA6k	Neg Reciprocity Opposition	.004	.001	3.68	.002	.001	2.03
BETA7k	Pos Reciprocity Affiliation	.003	.001	3.46	.002	.001	2.90
BETA8k	Pos Reciprocity Cooperation	.008	.001	7.29	.003	.001	3.80

Note. Random effects of log odds ratios for individual level contrasts ($\beta_{1k\text{-}4k}$) were included as controls in the model (i.e., β_{1k} = Husband Affiliation:Disaffiliation; β_{2k} = Husband Cooperation:Opposition; β_{3k} = Wife Affiliation:Disaffiliation; β_{4k} = Wife Cooperation:Opposition). Means and variances for these variables are not presented in the table in service of brevity given that they were not included as predictors in the final latent growth curve model predicting satisfaction.

Table 6. Latent Growth Curve Model of affiliation and cooperation sequences and maximum duration of sequences predicting husbands' and wives' relationship satisfaction intercepts and slopes

	Intercept		Slope	
	Husband	Wife	Husband	Wife
Effect	B (SE)	B (SE)	B (SE)	B (SE)
Husband Lead				
Negative Reciprocity Affiliation	-.02 (.10)	0.05 (.10)	-.03 (.15)	-0.04 (.12)
Negative Reciprocity Cooperation	.06 (.08)	-0.03 (.08)	.06 (.13)	0.07 (.10)
Positive Reciprocity Affiliation	.01 (.09)	-0.05 (.09)	-.02 (.14)	0.01 (.11)
Positive Reciprocity Cooperation	.05 (.09)	0.10 (.08)	.02 (.14)	-0.02 (.12)
Negative Reciprocity Affiliation- Duration	.06 (.09)	0.06 (.08)	-.12 (.14)	-0.16 (.11)
Negative Reciprocity Cooperation- Duration	-.07 (.08)	0.02 (.08)	.01 (.12)	0.01 (.10)
Positive Reciprocity Affiliation- Duration	.08 (.09)	-0.02 (.08)	-.01 (.13)	-0.06 (.10)
Positive Reciprocity Cooperation- Duration	-.14 (.09)	0.04 (.09)	-.10 (.14)	-0.13 (.11)
Wife Lead				
Negative Reciprocity Affiliation	-.08 (.09)	0.15 (.09)	-.02 (.14)	-0.17 (.12)
Negative Reciprocity Cooperation	.02 (.10)	0.11 (.09)	.16 (.15)	-0.16 (.12)
Positive Reciprocity Affiliation	-.01 (.10)	-0.05 (.10)	.08 (.15)	**0.28 (.12)***
Positive Reciprocity Cooperation	.07 (09)	0.09 (.09)	.09 (.13)	0.17 (.11)
Negative Reciprocity Affiliation- Duration	.02 (.09)	0.12 (.09)	-.07 (.13)	**-.30 (.11)****
Negative Reciprocity Cooperation- Duration	-.05 (.08)	-0.11 (.08)	-.20 (.13)	0.08 (.10)
Positive Reciprocity Affiliation- Duration	.04 (.09)	-0.10 (.09)	-.14 (.13)	0.01 (.11)
Positive Reciprocity Cooperation- Duration	-.02 (.09)	0.03 (.09)	-0.07 (.12)	-0.18 (.10)

Note. Standardized estimates are presented. RMSEA = .03, SRMR = .04 for husband-lead model, RMSEA = .04, SRMR = .04 for wife-lead model.
** p<.05, ** p<.01, *** p<.001.*

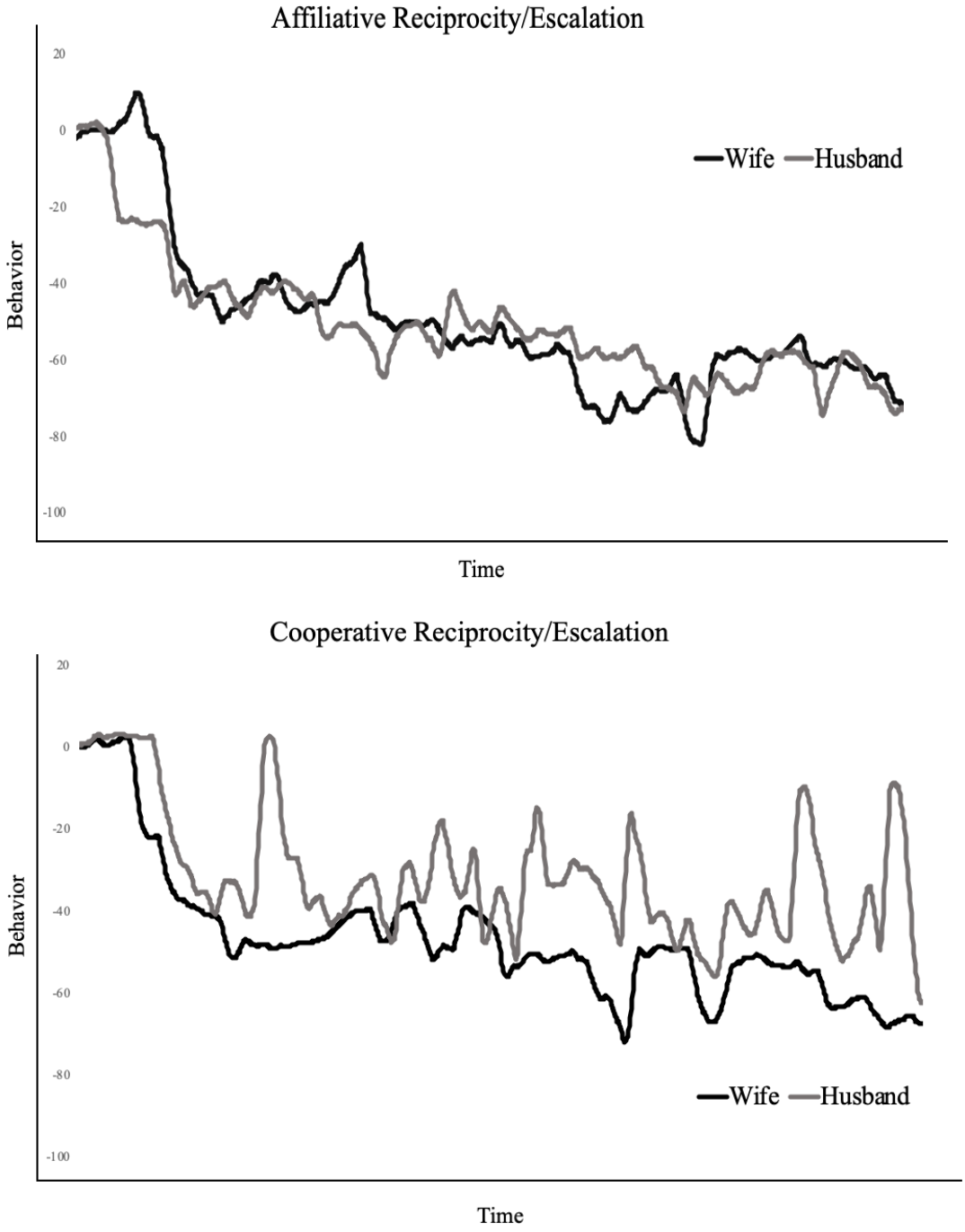

Figure 4. Time series of dyadic affiliative and cooperative behavior for sample couple. This sample couple was relatively dissatisfied with a relatively negative trajectory over time; wife relationship satisfaction intercept and slope are 1 SD below mean and husband relationship satisfaction intercept and slope are 2 SD below mean.

Table 7. Sample Sequence Counts and Data Structure for a Single Couple Based on Specified Quadrants

		Wife Consequent Behavior			
Husband Antecedent Behavior		Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4
Quadrant 1: +Δ Affiliation/ +Δ Cooperation		10	7	5	6
Quadrant 2: -Δ Affiliation/ +Δ Cooperation		3	6	9	2
Quadrant 3: -Δ Affiliation/ -Δ Cooperation		8	7	10	6
Quadrant 4: +Δ Affiliation/ -Δ Cooperation		5	5	7	10

CSID	CEL	CNT	TOT	R1	R2	R3	R4	R5	R6	C1	C2	C3	C4	C5	C6	Q1	Q2	Q3	Q4
1	11	10	106	1	1	1	1	1	1	0	0	0	0	0	0	1	0	0	0
1	12	7	106	1	1	1	-1	0	0	0	0	1	1	0	0	-1	0	0	0
1	13	5	106	1	1	1	0	-1	0	0	0	-1	0	0	1	-1	0	0	0
1	14	6	106	1	1	1	0	0	-1	0	0	0	-1	0	-1	-1	0	0	0
1	21	3	106	-1	0	0	1	1	1	1	1	0	0	0	0	0	-1	0	0
1	22	6	106	-1	0	0	-1	0	0	1	1	1	1	0	0	0	1	0	0
1	23	9	106	-1	0	0	0	-1	0	1	1	-1	0	0	1	0	-1	0	0
1	24	2	106	-1	0	0	0	0	-1	1	1	0	-1	0	-1	0	-1	0	0
1	31	8	106	0	-1	0	1	1	1	-1	0	0	0	1	0	0	0	-1	0
1	32	7	106	0	-1	0	-1	0	0	-1	0	1	1	1	0	0	0	-1	0
1	33	10	106	0	-1	0	0	-1	0	-1	0	-1	0	1	1	0	0	1	0
1	34	6	106	0	-1	0	0	0	-1	-1	0	0	-1	1	-1	0	0	-1	0
1	41	5	106	0	0	-1	1	1	1	0	-1	0	0	-1	0	0	0	0	-1
1	42	5	106	0	0	-1	-1	0	0	0	-1	1	1	-1	0	0	0	0	-1
1	43	7	106	0	0	-1	0	-1	0	0	-1	-1	0	-1	1	0	0	0	-1
1	44	10	106	0	0	-1	0	0	-1	0	-1	0	-1	-1	-1	0	0	0	1

Note. R1-R6 = row contrast vectors for husband Quadrant 1 vs. Quadrant 2, Quadrant 1 vs. Quadrant 3, Quadrant 1 vs. Quadrant 4, Quadrant 2 vs. Quadrant 3, Quadrant 3 vs. Quadrant 4; C1-C6 = column contrast vectors for Quadrant 1 vs. Quadrant 2, Quadrant 1 vs. Quadrant 3, Quadrant 1 vs. Quadrant 4, Quadrant 2 vs. Quadrant 3, Quadrant 3 vs. Quadrant 4; Q1 = association contrast vector for Quadrant 1 reciprocation vs. Quadrant 2, 3, or 4; Q2 = association contrast vector for Quadrant 2 reciprocation vs. Quadrant 1, 3, or 4; Q3 = association contrast vector for Quadrant 3 reciprocation vs. Quadrant 1, 2, or 4; Q4 = association contrast vector for Quadrant 4 reciprocation vs. Quadrant 1, 2, or 3.

Table 8. Means and Variances for Random Effects for Reciprocity Within Specified Quadrants

Parameter	Effect	M	SE of mean	M/SE	Variance	SE of Variance	Variance/SE
Husband Lead							
BETA9k	Q1 Reciprocity	.08	.01	12.56	.01	.001	10.27
BETA10k	Q2 Reciprocity	.01	.01	1.63	.01	.002	5.09
BETA11k	Q3 Reciprocity	.07	.01	11.39	.01	.001	10.33
BETA12k	Q4 Reciprocity	.01	.02	.39	.08	.040	1.92
Wife Lead							
BETA9k	Q1 Reciprocity	.07	.01	12.11	.01	.002	7.34
BETA10k	Q2 Reciprocity	.01	.02	.65	.08	.080	.96
BETA11k	Q3 Reciprocity	.07	.01	10.33	.01	.003	3.25
BETA12k	Q4 Reciprocity	.04	.02	1.86	.07	.030	2.53

Note. Random effects of log odds ratios for individual level contrasts ($\beta_{1k\text{-}8k}$) were included as controls in the model (i.e., β_{1k} = Husband Q1: Q2; β_{2k} = Husband Q1: Q3; β_{3k} = Husband Q1: Q4; β_{4k} = Husband Q2: Q3; β_{5k} = Husband Q2: Q4; β_{6k} = Husband Q3: Q4; β_{7k} = Wife Q1: Q2; β_{8k} = Wife Q1: Q3; β_{9k} = Wife Q1: Q4; β_{10k} = Wife Q2: Q3; β_{11k} = Wife Q2: Q4; β_{12k} = Wife Q3: Q4). Means and variances for these variables are not presented in the table in service of brevity given that they were not included as predictors in the final latent growth curve model predicting satisfaction.

Table 9. Latent Growth Curve Model of quadrant sequences and maximum duration of sequences predicting husbands' and wives' relationship satisfaction intercepts and slopes

	Intercept		Slope	
Effect	Husband B (SE)	Wife B (SE)	Husband B (SE)	Wife B (SE)
Husband Lead				
Reciprocity Quadrant 1	**.28 (.10)****	.18 (.11)	.15 (.16)	.09 (.13)
Reciprocity Quadrant 3	.01 (.11)	.06 (.10)	.22 (.16)	**-.30 (.13)***
Reciprocity Quadrant 1- Duration	-.08 (.10)	.03 (.09)	.26 (.15)	-.25 (.13)
Reciprocity Quadrant 3- Duration	**-.21 (.10)***	-.12 (.10)	.06 (.14)	.13 (.12)
Wife Lead				
Reciprocity Quadrant 1	.15 (.09)	-.01 (.09)	-.16 (.15)	.11 (.12)
Reciprocity Quadrant 3	-.07 (.10)	.12 (.10)	.09 (.17)	-.03 (.14)
Reciprocity Quadrant 1- Duration	.01 (.09)	**.18 (.09)***	.04 (.13)	-.23 (.11)
Reciprocity Quadrant 3- Duration	-.16 (.10)	-.17 (.10)	-.04 (.15)	-.06 (.12)

Note. Standardized estimates are presented. RMSEA = .03, SRMR = .04 for husband-lead model, RMSEA = .04, SRMR = .04 for wife-lead model.
** p<.05, ** p<.01, *** p<.001.*

STUDY 2:

Applying the Peak-End Rule to Couple Interaction:

Brief Moments Outperform Behavioral Aggregates in Predicting Relationship Satisfaction

Introduction

Partners in intimate relationships are behaviorally interdependent (Kelley, 1959), and couples, couple therapists, and relationship scientists all assume that the overall quality of an intimate relationship is a reflection of the manner in which couples communicate about and manage their interdependence. Theoretical efforts to map judgments of relationship satisfaction onto specific communicative acts began with the structural model of marital interaction (Gottman, 1979; also see Wills, Weiss, & Patterson, 1974), which differentiated satisfied and distressed couples on the basis of various positive and negative actions (e.g., generating effective solutions, blaming the partner for unresolved problems) and on the basis of patterns of reciprocated behaviors (e.g., extended sequences of negativity). Social exchange theorists would later elaborate on this view, noting that "With each successive pro-relationship act—and with each successive act of reciprocity—the magnitude of individuals' departures from self-interest increases by a small degree, and the magnitude of benefits to the partner and the relationship increases by a small degree … Over time, this type of cyclical mutual growth should do much to enhance the quality and vitality of an ongoing involvement" (Rusbult et al., 1999, p. 429). Common to both perspectives is the idea that the overall quality of a relationship will be evidenced by, and predicted by, the steady accumulation of partners' exchanged behaviors. Recent models similarly emphasize the importance of the overall, aggregated tenor or valence of communication as a key indicator of relationship quality, as exemplified by the recommendation that couples consistently enact a specific ratio of positive to negative behaviors in order to

maintain a healthy relationship (e.g., a 5-to-1 ratio; Gottman, 1999).

Empirical efforts to corroborate this conceptualization of couple interaction, while plentiful, yield mixed results. Cross-sectionally, self-reports of relationship satisfaction are indeed higher among couples displaying more positivity and less negativity (for a meta-analysis, see Woodin, 2011). However, in some longitudinal studies, higher levels of positivity have been shown to predict *faster* declines in relationship satisfaction (e.g., Cohan & Bradbury, 1997; Gottman & Krokoff, 1989) while higher levels of negativity have been shown to predict *slower* declines in relationship satisfaction (e.g., Gottman & Krokoff, 1989; Heavey, Layne, & Christensen, 1993; Karney & Bradbury, 1997; Overall, Fletcher, Simpson, & Sibley, 2009). In other studies, behavior-to-satisfaction effects are relatively weak or contradictory (e.g., Filsinger & Thoma, 1988; Lavner, Karney, & Bradbury, 2016). Experimentally-induced changes in positive and negative behavior, examined in the context of randomized, controlled tests of clinical interventions on relationship satisfaction, also produce unexpected results: increases in positivity sometimes undermine relationship satisfaction (e.g., Schilling, Baucom, Burnett, Allen, & Ragland, 2003), decreases in negativity do not routinely benefit relationships (e.g., Stanley, Rhoades, Olmos-Gallo, & Markman, 2007; also see Bodenmann, Bradbury, & Pihet, 2008), and improvements in positive and negative communication fail to mediate reliable effects of treatment on satisfaction (e.g., Williamson et al., 2016). Thus, although mutual exchange of behavior is an essential and defining feature of intimate relationships, basic questions remain about which specific aspects of couple communication affect the quality of relationships.

How might we explain the apparent failure of specific behaviors, when accumulated, to reliably capture the interpersonal processes that foreshadow how relationships develop and change? One possibility is that certain moments in couples' conversations are more

consequential than other moments. By simply aggregating across all observed moments of a specific type in an undifferentiated manner, current approaches therefore fail to assign weights to specific time points in interaction that are most diagnostic of the interpersonal processes that govern change in relationship satisfaction. To address this problem, we aim to identify consequential moments during couple interaction using the *peak-end rule* (Fredrickson & Kahneman, 1993), which states that evaluations of affective experiences are influenced less by the aggregated ratings of the entire experience and more by the most intense moments, or peaks, and by the endpoints of those experiences. Peak-end effects are well-replicated across a diverse range of scenarios, such as perceptions of pain (e.g., Stone et al., 2000), subjective assessments of consumer goods (Do et al., 2008), and enjoyment derived from playing games (Gutwin et al., 2016). For example, when exposed to two physically painful experiences, individuals prefer the task that ends more positively, even if the total experience before the endpoint is identical across tasks (Kahneman et al., 1993). Peak-end phenomena are typically observed in circumstances that naturally elicit strong but time-varying affective experiences, and the behavioral samples generated by couple conflict paradigms fulfill these criteria well: partners' differences of opinion reliably evoke feelings of frustration, humor, and affection, which fluctuate as partners identify points of agreement and disagreement, work out the details of their differing views, and explore solutions as they move toward resolving their time-limited conversations (Levenson et al., 2014).

Current Study

Applied to couple interaction, the peak-end rule leads us to hypothesize that partners' experiences during conflict will lead them to evaluate their relationship more positively cross-sectionally and over time to the extent that moments of greatest affiliation and cooperation are more positive, that moments of poorest affiliation and cooperation are less negative, and that

affiliation and cooperation in the final moments are more positive. We test this hypothesis against the competing view, derived from social learning and social exchange perspectives, that reports of satisfaction and changes in satisfaction will be predicted reliably by mean levels of observed behaviors. To mirror the moment-by-moment data collected in basic peak-end studies, we conduct moment-by-moment observational coding of spouses' behaviors during a standard problem-solving task, and we organize that coding along one dimension that captures how cooperative versus oppositional partners are at addressing the specific problem at hand and along a second dimension that captures how affiliative versus disaffiliative partners are at relating to one another during the interaction. As interpersonal expressions of emotion tend to be more important than communication skills in predicting change in couple satisfaction (e.g., Johnson et al., 2005; also see Bloch, Haase, & Levenson, 2014), we expect to see stronger results for the affiliative dimension than the cooperative dimension.

Method

Participants

In keeping with calls to conduct research on diverse populations (e.g., Henrich, Heine, Norenzayan, 2010), we sampled newlywed couples living in high-poverty neighborhoods in Harris County, Texas, a region with a large and diverse population. Recently married couples were identified through names and addresses on publicly available marriage license applications, which were obtained from the Harris County Recorder's Office in 2014 and 2015. Addresses were cross-referenced with census data to identify couples living in high-poverty communities, defined as census block groups within Harris County for which 30% or more of the households were categorized by the census as living below poverty (U.S. Census Bureau, 2008-2012), thereby oversampling from the understudied population of couples living in high-poverty

neighborhoods. Identified couples were screened via telephone or in person to confirm that they had married, that neither partner had been previously married, and that partners were in a mixed-sex relationship; at the time, same-sex marriage was not legal in Texas. A total of 4,916 couples were identified through addresses listed on their marriage licenses. Among the couples contacted, 3,535 could not be reached and 1,157 agreed to be screened for eligibility. Of those, 506 couples were screened as eligible, and 401 of them agreed to participate in the study, with 231 couples actually participating before the close of the recruitment window. A few interactions were not recorded because participants declined (n = 10) or because the equipment malfunctioned (n = 5), leaving 216 couples available for this analysis.

The current sample comprised 216 couples identified with the above procedures. Wives ranged in age from 18 to 56 years (M = 28.2, SD = 7.5) and husbands ranged in age from 18 to 53 years (M = 29.6, SD = 7.6). Fifty-two percent of wives and 51% of husbands were Hispanic. Of the remaining participants, the majority of wives and husbands were either Black (36% and 33%, respectively) or White (9% and 10%, respectively). Household income averaged $43,835 ($SD$ = $33,757), and approximately 64% of couples had children. The majority of husbands (58.8%) and wives (51.9%) had less than or equal to a high school diploma or GED, and 11.6% of husbands and 16.2% of wives had completed college.

Two trained interviewers visited couples in their homes to describe the IRB-approved study and obtain written informed consent from each participant. At baseline (T1), interviewers took spouses to separate areas in their homes to ensure privacy and then orally administered self-report measures. After completing self-report measures individually, partners were reunited for a series of 8-min videotaped discussions, including the 8-min problem-solving discussion that is the focus of the present analyses. Interviewers returned to couples' homes 9 months (T2) and 18

months (T3) later and administered the same interview protocol. Following each interview, couples were debriefed and paid ($75 for T1, $100 for T2, $125 for T3).

Measures

Relationship Satisfaction. Relationship satisfaction, defined as spouses' global sentiment towards the relationship, was assessed using a version of the Couple Satisfaction Index (CSI; Funk & Rogge, 2007). This version of the CSI is a 10-item measure of satisfaction, with higher scores indicating higher levels of satisfaction. The items assess global satisfaction (e.g., "I have a warm and comfortable relationship with my partner") and are rated on a 6-point Likert scale (0 = not at all true, 5 = completely true), with one item rated on a 7-point Likert scale (i.e., "All things considered how happy are you in your relationship," 0 = extremely unhappy, 6 = perfect). The possible range of scores on this scale is 0 to 51. Coefficient alpha exceeded .90 for husbands and wives across all waves of the study. Spouses were generally happy, with a mean satisfaction rating above 38 at all time points and SD between 7.91 and 10.93 at all time points.

Couple Communication. Continuous cooperation and affiliation ratings were made by trained observers as they watched the 8-min conflict interaction task on a computer monitor. Ratings on the cooperation and affiliation dimensions ranged from -100 to +100 and were made simultaneously using a computer joystick, sampled at a rate of once per half second. Custom software, the Dual Axis Rating and Media Annotation package (Girard & Wright, 2017), presented both the videotaped interaction task and a diagram of the circumplex. A moving dot corresponding with the current position of the joystick was displayed in the coordinate grid during the coding process to provide visual feedback on current ratings. Observers made ratings by moving the joystick continuously in accordance with the individual's statements, tone of voice, and nonverbal behaviors, in order to capture any change in cooperation and/or affiliation.

Examples of cooperative behaviors included offering solutions to the stated problem and offering statements of agreement or support for the partner's argument, whereas examples of oppositional behaviors included making statements about the partner's responsibility for the problem and disagreeing with the partner. Examples of affiliative behaviors included maintaining eye contact and smiling as well as verbal communications such as expressing love, praising, or validating the partner. In contrast, examples of disaffiliative behaviors included avoiding eye contact, failing to respond when addressed, as well as verbal communications such as cold or contemptuous comments. Cooperation and affiliation were coded simultaneously as many behaviors reflect blends of the two dimensions. Observers were instructed to maintain their most recent joystick position when interpersonal behavior remained unchanged, until the target person displayed an interpersonally meaningful behavior, unless the absence of behavior was itself interpersonally meaningful (e.g., failing to make eye contact or to respond to the other when addressed).

Twelve undergraduate research assistants were trained in the coding procedures, and 6 trained observers were assigned to code a given video (i.e., 8-minute conflict interaction) each week, rating each couple member in the assigned video. Each coder viewed each interaction three times, once without making any ratings, and then rating each partner separately in two subsequent passes. Videos were presented in blocked randomized order so that order of video and whether husband or wife was rated first differed across observers within a block. Reliabilities of each coded time-series, of which there were four per video (i.e., two coded dimensions each for both couple members) were calculated each week and reviewed in weekly observer meetings. Following the recommendations of Girard and Cohn (2016), these meetings serve to combat observer "drift" (i.e., error because of decreased motivation or forgetting coding guidelines) by analyzing and standardizing the criteria that observers use to provide behavioral

ratings. A small number of videos (25%) were rerated because of reliability falling below .60. As in Ross et al., 2017, we used an a priori rule to drop the single observer with the lowest agreement for each time-series (using a leave-one-out procedure), and then the moment-to-moment ratings from the remaining observers were averaged to create the final time-series composite. Inter-rater reliability was assessed using intraclass correlations (McGraw & Wong, 1996), which permit the inclusion or exclusion of between-rater variance as part of the error variance. A conservative "absolute ICC" coefficient was used for the present analyses which incorporates agreement on the level and relative patterning of rated behavior. Adequate inter-rater reliability was achieved for husbands and for wives, on both coded dimensions (husbands' ICC's were .67 for affiliation and .72 for cooperation; wives' ICC's were .67 for affiliation and .73 for cooperation). We also generated four summary scores by computing mean levels of affiliation and cooperation aggregated over the course of the entire interaction for husbands and for wives.

Identifying Peaks, Valleys, and Endpoints. To compute the maximum, minimum, and concluding values (i.e., peaks, valleys, endpoints) for husbands' and wives' behavior, the data were smoothed using centered moving averages and a window size of 6 half seconds. This window size was selected because graphical analysis in combination with computing the Mean Absolute Deviation (i.e., |smoothed data – original data|/number of deviations computed) indicated that this window size showed strong fidelity to the original data and small enough to capture the maximum and minimum values of behavior with great precision. In general, given a time series $X = \{x_1, x_2, \ldots, x_n\}$ and a fixed window size k, the first moving average is computed as an unweighted mean of the first k values neighboring around the $\frac{1+k}{2}$th value. If k is even, this center position is the largest integer that is smaller than $\frac{1+k}{2}$. The window continues to shift

forward by one unit in time until its center position reaches the smallest integer that is larger than or equal to $n - \frac{k}{2}$. For example, given $X = \{x_1, x_2, x_3, \ldots, x_{10}\}$ and a window size of 6, the first moving average equals $\frac{x_1 + x_2 + x_3 + x_4 + x_5 + x_6}{6}$ with x_3 as the center and the last moving average equals to $\frac{x_5 + x_6 + x_7 + x_8 + x_9 + x_{10}}{6}$ with x_7 as the center. Figure 1 shows a sample couple's time series data that includes peaks, valleys, ends, and mean levels of behavior on both dimensions.

Analytic Plan

Data were analyzed using latent growth curve modeling (LGCM). Consistent with the Actor Partner Interdependence Model (APIM; Kenny et al., 2006), husbands and wives were included in the same model to account for interdependence in the dyadic data and to test cross-spouse effects. Analyses were conducted in MPlus version 7.3 with Maximum Likelihood Robust (MLR) as the estimator was used to conduct all analyses.

The first stage of the growth curve analyses involved specifying the trajectory of relationship satisfaction across time by modeling the values at each timepoint as a function of an intercept and slope representing time for husbands and wives. The intercept represents levels of relationship satisfaction and the slope of time represents changes in satisfaction over time. Next, husbands' and wives' mean levels of affiliation and cooperation were added to the model as predictors to test the effects of aggregated levels of behavior. Finally, peaks, valleys, and endpoints of affiliation and cooperation, controlling for mean levels of affiliation and cooperation, were added to the model to predict intercepts and slopes of relationship satisfaction.

Results

Descriptive Statistics

We learn from the bivariate correlations shown in Table 1 that husbands' and wives' maxima, minima, and endpoints of affiliation were all correlated (r = .59, r = .49, r = .59, all

$p<.001$), respectively. The same was true for spouses' peaks, valleys, and ends of cooperative behavior ($r = .61$, $r = .60$, $r = .65$, all $p<.001$). Naturally, the peaks, valleys, and ends of behavior on each dimension within spouses were also correlated with one another, such that spouses whose peaks of cooperation/affiliation were more extremely positive also tended to enact less extremely negative valleys of these behaviors and tended to end with higher levels of cooperation/affiliation (correlations ranged from $r = .48$ to $r = .78$, all $p<.001$). For husbands and wives, higher levels of peak affiliation and cooperation during the course of the interaction covaried with higher levels of relationship satisfaction concurrently ($r = .20$, $p<.01$ for husbands' and wives' affiliation; $r = .14$, $p<.05$ for husbands' cooperation, $r = .03$, *ns* for wives' cooperation). Similarly, spouses whose minimum values of displayed affiliation and cooperation were less deep experienced higher relationship satisfaction at baseline ($r = .32$, $p<.001$ for husbands' affiliation and $r = .22$, $p<.01$ for wives' affiliation; $r = .20$, $p<.01$ for husbands' cooperation and $r = .18$, $p<.01$ for wives' cooperation). Higher levels of affiliation and cooperation displayed at the conclusion of the discussion covaried with higher levels of relationship satisfaction at baseline as well ($r = .30$, $p<.001$ for husbands' affiliation and $r = .18$, $p<.01$ for wives' affiliation; $r = .29$, $p<.001$ for husbands' cooperation and $r = .15$, $p<.05$ for wives' cooperation). Overall, these results lend support to the validity of the behavioral samples.

Latent Growth Curve Model

A LGCM including husband and wife intercept and slope latent variables (but no predictors) shows that the model fit the data well, exceeding the minimum value of .95 for the comparative fit index (CFI) and achieving good fit (<.05) indexed by the root mean square error of approximation and standardized root mean square residual (<.08), in accordance with suggestions made by Hu and Bentler (1999) for a good model fit (CFI = .99, RMSEA = .04,

SRMR = .06). Both spouses' intercept latent variables differed significantly from zero (M = 42.45, $p < .001$ for wives; M = 43.14, $p < .001$ for husbands), as did their slope latent variables (M = -1.93, $p < .001$ for wives; M = -1.18, $p < .001$ for husbands). Significant individual variability was found for both spouses' intercepts and slopes (wife intercept: $\sigma^2 = 56.09$, $p < .001$; wife slope: $\sigma^2 = 17.71$, $p < .01$; husband intercept: $\sigma^2 = 43.30$, $p < .001$; husband slope: $\sigma^2 = 7.32$, $p < .01$).

Effects of Average Levels of Behavior

Table 2 shows effects of the first latent growth curve model with standardized path coefficients, in which husbands and wives' average levels of cooperation and affiliation aggregated across the entire interaction were included as predictors of husbands' and wives' intercepts and slopes of relationship satisfaction. Two main findings emerged in this model, such that higher average levels of husbands' affiliation were concurrently associated with higher levels of their own and their wives' relationship quality ($\beta = .29$, $p < .05$ for husbands; $\beta = .37$, $p < .01$ for wives); husbands' average levels of affiliation did not predict changes in relationship satisfaction over time ($\beta = -.23$, *ns* for husbands; $\beta = .12$, *ns* for wives). Wives' levels of affiliation were not significantly associated with husbands' or wives' relationship satisfaction concurrently ($\beta = .09$, *ns* for husbands; $\beta = .19$, *ns* for wives) or longitudinally ($\beta = .15$, *ns* for husbands; $\beta = .07$, *ns* for wives). No significant cooperation effects emerged.

Incremental Effects of Peaks, Valleys, and Endpoints

Table 3 presents the second latent growth curve model with standardized path coefficients. Because of the complexity of the model, Figure 2 represents the latent growth curve model with only significant peak, valley and end effects shown. The model fit the data well, exceeding the minimum value of .95 for the comparative fit index (CFI) and achieving good fit

(<.05) indexed by the root mean square error of approximation, in accordance with suggestions made by Hu and Bentler (1999) for a good model fit (CFI = .99, RMSEA = .02).

When peaks, valleys, and endpoints were included, all significant main effects from Model 1 fell to nonsignificance. However, a new, and counterintuitive, effect of mean-level behavior emerged, such that husband cooperation predicted steeper declines in wives' satisfaction over time (B = .87, p < .05). A number of significant peak, valley, and end effects emerged from this latent growth curve model, suggesting that, over and above the effects of average levels of behavior, brief but extreme moments of partners' behavioral displays during the course of the discussion are reliably associated with relationship satisfaction. First, with respect to peak effects, higher peaks of wives' affiliative behavior were significantly associated with their own levels of relationship satisfaction (B = .35, p < .05), and this effect was stable over time (B = -.36, *ns*). Additionally, over and above the effects of average levels of cooperative behavior, higher peaks of husbands' cooperative behavior were significantly associated with their wives' lower levels of relationship satisfaction (B = -.59, p < .01) concurrently. Over time, wives experienced more positive trajectories of relationship satisfaction in response to these higher peaks of husband cooperative behavior at baseline (B = .69, p< .01). All other peak effects were nonsignificant.

Turning to valleys, or minimum values, of behavior, results revealed that husbands whose affiliation valleys were less negative experienced higher levels of relationship satisfaction concurrently (B = .54, p < .05) and more positive trajectories of satisfaction over time (B = .82, p< .05). All other valley effects were nonsignificant.

Finally, when considering endpoints, wives who displayed greater levels of affiliative behavior at the conclusion of the discussion experienced more positive trajectories of

relationship satisfaction over time (B = .43, p < .05). Higher levels of husbands' cooperative behavior at the conclusion of the conversation were significantly associated with husbands' own relationship satisfaction cross-sectionally (B = .40, p< .05), and this effect was stable over time (B = .07, *ns*). All other end effects were nonsignificant.

To summarize, while mean levels of behavior accounted for variability in levels of relationship satisfaction initially, these variables failed to predict changes in relationship satisfaction over time. On the other hand, over and above the effects of mean-level behavior, peaks and ends of behavior did account for cross-sectional levels of satisfaction and changes in satisfaction over time, such that higher peaks of husbands' cooperative behavior slowed declines in wives' satisfaction, higher valleys of husbands' affiliative behavior slowed declines in husbands' satisfaction, and higher ending values of wives' affiliative behavior slowed declines in wives satisfaction. Notably, significant effects of mean-level of behavior from the base model fell to nonsignificance when peaks, valleys, and ends were included in the model, though higher mean-level husband cooperation emerged as a predictor of declines in wives' satisfaction; this counterintuitive effect may suggest that relying on aggregated values of behavior are more susceptible to spurious findings.

Discussion

Models of communication and the interventions derived from them rely on the notion that the quality of relationships will be evidenced by, and predicted by, the accumulation of partners' exchanged behaviors. However, longitudinal studies of communication and relationship quality yield counterintuitive results, hinting that the accumulation model may be deficient in explaining how communication functions to bring couples closer to or further away from a sense of relationship wellbeing over time. Drawing from cognitive psychology, we propose the peak-end

rule (Fredrickson & Kahneman, 1993) as a lens through which to view behavior to satisfaction linkages, asserting that partners' perceptions of relationship quality are not consequences of interactions as a whole, but are instead determined by salient, brief moments. Following this principle, we predicted that couples would experience more positive relationship outcomes to the extent that partners enacted more positive peaks, less negative valleys, and more positive ending values of affiliative and cooperative behavior during a conflict interaction.

The central finding of the current work is that behavioral moments of maximum intensity (peaks and valleys) and concluding moments of couple interactions are able to predict relationship outcomes over and above global levels of behavior. Moreover, all significant effects of global, mean levels of behavior from the base model fell to nonsignificance when peaks, valleys, and ends were included. However, this model suggested that higher mean levels of husband cooperation quickened declines in wives' satisfaction over time; this counterintuitive effect lends support to the argument that relying on aggregated values of behavior are more vulnerable to yielding spurious results.

Collectively, there is some evidence that more positive peak values and less negative valley values on both dimensions of behavior (i.e., affiliation and cooperation) are associated with better relationship quality initially and more positive trajectories of relationship quality over time. Specifically, wives who enacted more positive peaks of affiliative behavior were more satisfied in their relationships. While higher peak levels of husband cooperation were unexpectedly associated with lower levels of wives' satisfaction initially, these higher peak levels did predict more positive trajectories of wives' satisfaction over time, suggesting that high levels of problem-solving may not be satisfying at the time but do yield positive changes in wives' perceived relationship quality over time. It was also the case that husbands who enacted

less negative valleys of affiliative behavior were more satisfied with their relationships initially and experienced slower declines in satisfaction over time.

Behavior at the endpoint of interaction also appeared to have consequences for relationship quality initially and over time. Specifically, concluding the conversation with higher levels of husband cooperation was diagnostic of higher satisfaction among husbands initially. On the other hand, wives who ended the interaction with higher levels of affiliation experienced slower declines in their relationship satisfaction over time.

Although the longitudinal and observational nature of the data help strengthen our conclusions, several important limitations should be noted. First, despite successfully recruiting an ethnically and socioeconomically diverse sample, our sample does not include older couples or same sex couples, thus limiting generalizability. Second, by relying on a novel coding system, rather than more traditional methodology for rating behavioral data, it is difficult to make direct comparisons between the results found here and those obtained by prior research. However, with the objective of investigating peaks/valleys and ends of behavior, we elected this coding system that offered moment-to-moment measurement of two broad domains of behavior. This approach yielded more reliable estimates of peaks/valleys and ends and allowed us to study these brief moments in the context of broad dimensions rather than getting overly entangled in the details of specific affects and behaviors offered by other coding systems. Third, the current sample size was modest in size. However, the current sample did offer sufficient power to test the relevant research questions. Moreover, when compared to the 64 studies used in a meta-analysis of communication-satisfaction associations, the current sample size fell well within the range of sample sizes from said studies included in the meta-analysis (range = 6 to 267 participants; Woodin, 2011). Nevertheless, future research would benefit from replicating the current study

findings in a larger sample. Fourth, the longitudinal follow-up included in the current study was brief (i.e., 18 months), and a longer-term investigation of behavior effects, both based on the cumulative model and peak/end model, on relationship trajectories would be beneficial. That being said, the current time frame still revealed a number of slope effects, suggesting that longitudinal changes were detected by the current data.

Notwithstanding these limitations, the results of this work combine with several other studies to cast doubt on the accumulation model of behavior and, more critically, advance the idea that a few brief moments in interaction—peaks, valleys, and ending moments—are key determinants of spouses' global sentiments towards their relationships. This message has important implications for theory, research, and intervention. First, these findings suggest that salient moments of interaction are crucial for relationship wellbeing, regardless of duration or even specific substance of a behavior. Of course, there may be many different kinds of behaviors that contribute to the most salient moments of interaction, and different behaviors may be more or less important for different couples. While the current work highlighted effects of affiliation and cooperation, there are likely other domains of behavior that contribute to the most impactful moments of interaction, and future research would benefit from revisiting these peaks, valleys, and ends at the observational coding stage by transcribing verbal content and developing a common language to describe the behaviors that commonly make up these brief, meaningful moments. While the current work illuminated the potency of these brief moments over the course of an 8-minute conflict interaction, it is likely that this phenomenon is not limited to this time course. Future efforts to replicate the current findings might benefit from daily diary methods, for example, to elucidate how peaks, valleys, and ends of interpersonal exchanges over the course of a day or week are linked to relationship outcomes. Next, we can only speculate how

spouses' peaks, valleys, and ends of interaction become linked to relationship satisfaction over time. To address this issue, the addition of a video-mediated recall procedure would allow for spouses to corroborate the peaks, valleys, and ends identified by objective observational coders. Furthermore, future research would benefit from measuring spouses' post-discussion affect and evaluation of discussion quality in service of testing factors that mediate associations between brief moments of behavior and relationship satisfaction over time.

Finally, this work has implications for relationship distress prevention efforts. Specifically, prevention programs may be more successful to the extent that they teach couples to modulate the intensity of their behavior during conflict, such that their most positive moments are very positive, their most negative moments are not extremely negative, and their discussions end on a positive note. In conclusion, study results reveal that the extreme moments and concluding moments during marital interaction are salient determinants of overall sentiments towards the relationship, thus promoting a number of possibilities for future event-based investigations of couple interaction.

References

Baucom, D. H., Shoham, V., Mueser, K. T., Daiuto, A. D., & Stickle, T. R. (1998). Empirically supported couple and family interventions for marital distress and adult mental health problems. *Journal of consulting and clinical psychology, 66*(1), 53.

Bloch, L., Haase, C. M., & Levenson, R. W. (2014). Emotion regulation predicts marital satisfaction: more than a wives' tale. *Emotion (Washington, D.C.), 14*(1), 130–144.

Bradbury, T. N., & Fincham, F. D. (1988). Individual difference variables in close relationships: A contextual model of marriage as an integrative framework. *Journal of Personality and Social Psychology, 54*(4), 713.

Bradbury, T. N., & Karney, B. R. (1993). Longitudinal study of marital interaction and dysfunction: Review and analysis. *Clinical Psychology Review, 13*(1), 15-27.

Cohan, C. L., & Bradbury, T. N. (1997). Negative life events, marital interaction, and the longitudinal course of newlywed marriage. *Journal of Personality and Social Psychology, 73*(1), 114.

Do, A. M., Rupert, A. V., & Wolford, G. (2008). Evaluations of pleasurable experiences: the peak-end rule. *Psychonomic Bulletin & Review, 15*(1), 96-98.

Filsinger, E. E., & Thoma, S. J. (1988). Behavioral antecedents of relationship stability and adjustment: A five-year longitudinal study. *Journal of Marriage and the Family, 50*(3), 785-795.

Fredrickson, B. L. (2000). Extracting meaning from past affective experiences: The importance of peaks, ends, and specific emotions. *Cognition and Emotion, 14*(4), 577-606.

Fredrickson, B.L., & Kahneman, D. (1993). Duration neglect in retrospective evaluations of affective episodes. *Journal of Personality and Social Psychology, 65,* 45-55.

Funk, J. L., & Rogge, R. D. (2007). Testing the ruler with item response theory: increasing precision of measurement for relationship satisfaction with the Couples Satisfaction Index. *Journal of Family Psychology, 21*(4), 572.

Girard, J. M., & Wright, A. G. C. (2017). DARMA: Dual axis rating and media annotation. *Behavior Research Methods*, *50*, 1-8.

Girard, J. M., & Cohn, J. F. (2016). A primer on observational measurement. Assessment. Advance online publication.

Gottman, J. (1999). The Marriage Clinic: A Scientifically Based Marital Therapy. New York, NY: W.W. Norton & Co.

Gottman, J. M., Coan, J., Carre`re, S., & Swanson, C. (1998). Predicting marital happiness and stability from newlywed interactions. Journal of Marriage and the Family, 60, 5 – 22.

Gottman, J. M., & Krokoff, L. J. (1989). Marital interaction and satisfaction: A longitudinal view. *Journal of Consulting and Clinical Psychology*, *57*, 47–52.

Gutwin, C., Rooke, C., Cockburn, A., Mandryk, R. L., & Lafreniere, B. (2016). Peak-end effects on player experience in casual games. In Proceedings of the 2016 CHI conference on human factors in computing systems (pp. 5608-5619). ACM.

Heavey, C. L., Layne, C., & Christensen, A. (1993). Gender and conflict structure in marital interaction: A replication and extension. *Journal of Consulting and Clinical psychology*, *61*(1), 16.

Jacobson, N.S., Christensen, A., Prince, S.E., Cordova, J., & Eldridge, K. (2000). Integrative behavioral couple therapy: an acceptance-based, promising new treatment for couple discord. *Journal of Consulting and Clinical Psychology, 68*(2), 351.

Kahneman, D. (2000). Evaluation by moments: Past and future. In D. Kahneman, & A. Tversky, *Choices, Values, and Frames.* New York: Cambridge University Press.

Karney, B. R., & Bradbury, T. N. (1995). The longitudinal course of marital quality and stability: A review of theory, methods, and research. *Psychological Bulletin, 118*, 3-34.

Karney, B.R., & Bradbury, T.N. (1997). Neuroticism, marital interaction, and the trajectory of marital satisfaction. *Journal of Personality and Social Psychology, 72,* 1075-1092.

Kenny, D. A., Kashy, D. A., & Cook, W. L. (2006). *Dyadic data analysis*. Guilford press.

Kiecolt-Glaser, J. K., & Newton, T. L. (2001). Marriage and health: His and hers. *Psychological bulletin*, *127*(4), 472.

Kim, H. K., Capaldi, D. M., & Crosby, L. (2007). Generalizability of Gottman and colleagues' affective process models of couples' relationship outcomes. *Journal of Marriage and Family*, *69*(1), 55-72.

Levenson, R. W., Haase, C. M., Bloch, L., Holley, S. R., & Seider, B. H. (2014). Emotion regulation in couples. In J. J. Gross (Ed.), *Handbook of emotion regulation* (p. 267–283). Guilford Press.

McGraw, K. O., & Wong, S. P. (1996). Forming inferences about some intraclass correlation coefficients. *Psychological Methods*, *1*, 30–46.

Melby, J., Conger, R., Book, R., Rueter, M., Lucy, L., Repinski, D., . . .Scaramella, L. (1998). The Iowa Family Interaction Rating Scales (5th ed.). Unpublished manuscript, Institute for Social and Behavioral Research, Iowa State University, Ames, Iowa.

Overall, N. C., Fletcher, G. J., Simpson, J. A., & Sibley, C. G. (2009). Regulating partners in intimate relationships: The costs and benefits of different communication strategies. *Journal of Personality and Social Psychology, 96*, 620-639.

Redelmeier, D. & Kahneman, D .(1996). Patients' memories of pain medical treatments: Real-time and retrospective evaluations of two minimally invasive procedures. *Pain, 66,* 3-8.

Renick, M.J., Blumberg, S.L., & Markman, H.J. (1992). The Prevention and Relationship Enhancement Program (PREP): An empirically based preventive intervention program for couples. *Family Relations*, *41*(6), 141-147.

Roddy, M.K., Nowlan, K.M., Doss, B.D., & Christensen, A. (2016). Integrative behavioral couple therapy: Theoretical background, empirical research and dissemination. *Family Process*, *55*(3), 408-422.

Rusbult C.E., Wieselquist J., Foster C.A., Witcher B.S. (1999) Commitment and Trust in Close Relationships. In: Adams J.M., Jones W.H. (eds) Handbook of Interpersonal Commitment and Relationship Stability. Perspectives on Individual Differences. Springer, Boston, MA.

Schilling, E. A., Baucom, D. H., Burnett, C. K., Allen, E. S., & Ragland, L. (2003). Altering the course of marriage: the effect of PREP communication skills acquisition on couples' risk of becoming maritally distressed. *Journal of family psychology, 17,* 41.

Sels, L., Ceulemans, E., & Kuppens, P. (2019). A test of the peak-end rule in couples' conflict discussions. *European Journal of Social Psychology*, *49*(4), 794-806.

Stanley, S. M., Markman, H. J., & Whitton, S. W. (2002). Communication, conflict, and commitment: Insights on the foundations of relationship success from a national survey. *Family process*, *41*(4), 659-675.

Stanley, S. M., Rhoades, G. K., Olmos-Gallo, P. A., & Markman, H. J. (2007). Mechanisms of change in a cognitive behavioral couples prevention program: Does being naughty or nice matter?. *Prevention Science, 8*(3), 227-239.

Stone, A. A., Broderick, J. E., Kaell, A. T., DelesPaul, P. A., & Porter, L. E. (2000). Does the peak-end phenomenon observed in laboratory pain studies apply to real-world pain in rheumatoid arthritics?. *The Journal of Pain, 1*(3), 212-217.

Williamson, H. C., Altman, N., Hsueh, J., & Bradbury, T. N. (2016). Effects of relationship education on couple communication and satisfaction: A randomized controlled trial with low-income couples. *Journal of Consulting and Clinical Psychology, 84*, 156-166.

Woodin, E. M. (2011). A two-dimensional approach to relationship conflict: Meta-analytic findings. *Journal of Family Psychology, 25*, 325-335.

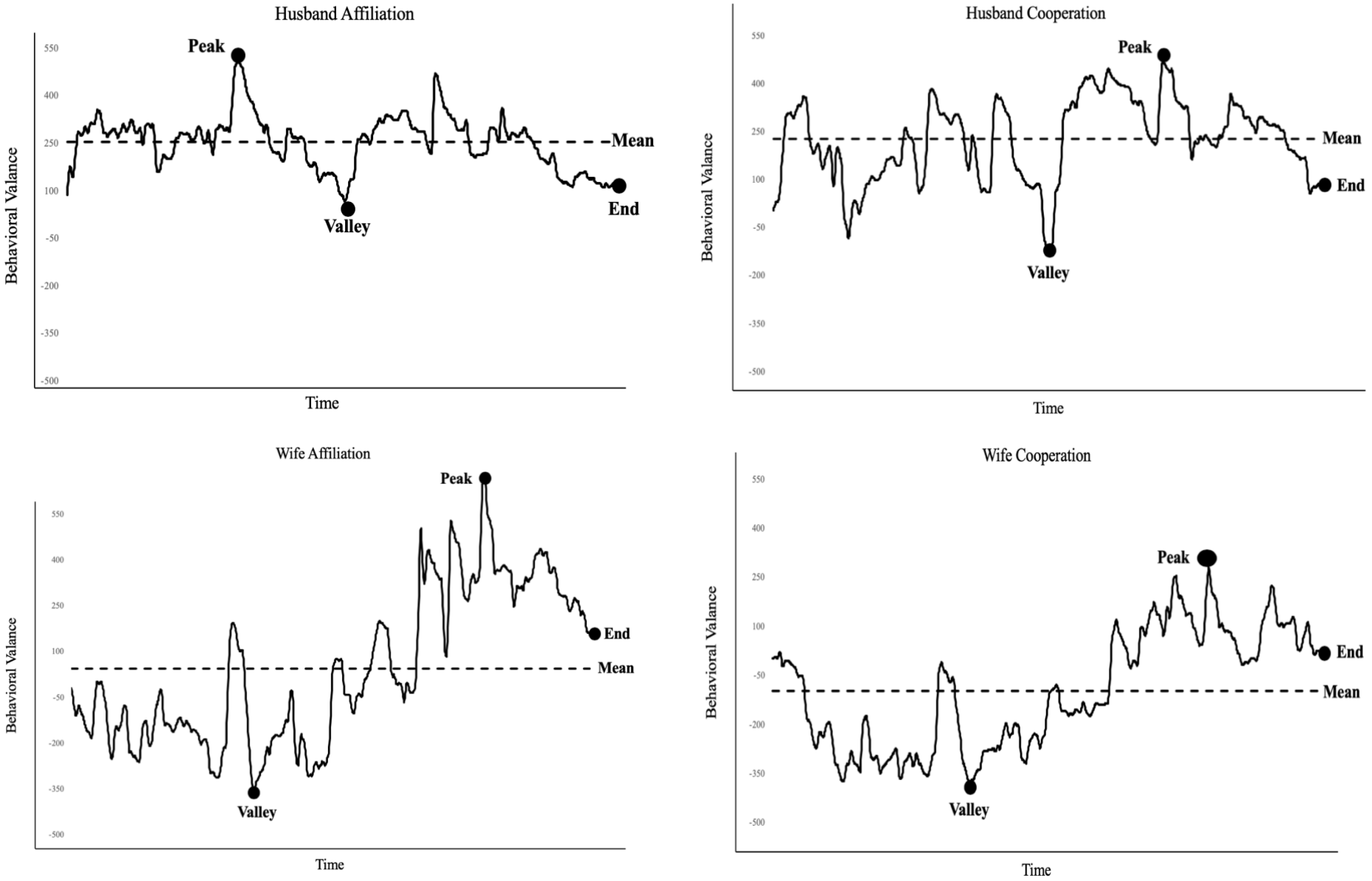

Figure 1. Sample time series data from one couple representing peaks, valleys, ends, and mean levels of behavior on both dimensions.

Table 1. *Correlations and Descriptive Statistics for All Variables in Model*

Variable	1	2	3	4	5	6	7	8	9	10	11	*Mean*	*SD*
(1) Peak Affiliation	**.59*** **	.53***	.70***	.62***	.48***	.52***	.76***	.59***	.20**	-.07	-.01	41.44	16.6
(2) Valley Affiliation	.65***	**.49*** **	.73***	.53***	.67***	.58***	.89***	.65***	.22**	-.12	-.05	-13.99	19.77
(3) End Affiliation	.78***	.82***	**.59*** **	.59***	.57***	.71***	.84***	.63***	.18**	-.01	.03	17.74	24.8
(4) Peak Cooperation	.69***	.56***	.64***	**.61*** **	.67***	.74***	.65***	.87***	.03	-.03	-.08	41.99	20.45
(5) Valley Cooperation	.57***	.66***	.59***	.73***	**.60*** **	.74***	.67***	.89***	.18**	-.14*	-.06	-34.64	22.18
(6) End Cooperation	.63***	.63***	.76***	.78***	.75***	**.65*** **	.65***	.83***	.15*	-.08	-.04	7.08	33.4
(7) Affiliation Mean	.83***	.91***	.88***	.69***	.70***	.70***	**.51*** **	.72***	.22**	.17*	.18*	16.26	17.99
(8) Cooperation Mean	.67***	.66***	.66***	.89***	.90***	.84***	.75***	**.70*** **	.12	.05	.08	3.21	26.09
(9) T1 Satisfaction	.20**	.32***	.30***	.14*	.20**	.29***	.28***	.19**	**.50*** **	.52**	.34**	42.05	7.91
(10) T2 Satisfaction	.04	-.04	-.01	.04	-.06	-.04	.11	.06	.6	**.40** **	.62**	41.51	8.89
(11) T3 Satisfaction	-.04	-.06	-.03	-.06	-.12	-.11	.1	.09	.58	.73	**.44** **	38.96	10.93
Mean	39.13	-18.19	12.97	41.67	-33.40	6.58	11.7	3.57	43.05	42.44	40.71		
SD	19.56	23.41	29.94	22.37	22.21	34.80	22.02	27.65	7.91	8.61	9.75		

Note. N = 216 wives and 216 husbands. Results for wives are above the diagonal, and results for husbands are below the diagonal. Correlations between husbands' and wives' scores are on the diagonal, in bold.
** p<.05, ** p<.01, *** p<.001.*

Table 2. *Fixed Effects of Average Levels Affiliation/Cooperation on Relationship Satisfaction*

	Husband Intercept	Wife Intercept	Husband Slope	Wife Slope
Effect	B(SE)	B(SE)	B(SE)	B(SE)
Husbands' Mean Affiliation	.29 (.13)*	.37 (.13)**	-.23 (.19)	.12 (.17)
Wives' Mean Affiliation	.09 (.13)	.19 (.12)	.15 (.18)	.07 (.16)
Husbands' Mean Cooperation	.10 (.16)	-.14 (.16)	.05 (.22)	-.27 (.20)
Wives' Mean Cooperation	-.21 (.15)	-.08 (.15)	-.16 (.21)	.02 (.19)

Note. $p<.05$, ** $p<.01$, *** $p<.001$.*

Table 3. *Fixed Effects of Affiliation/Cooperation Peaks, Valleys, Ends, Controlling for Means on Relationship Satisfaction*

	Husband Intercept				Wife Intercept				Husband Slope				Wife Slope			
Effect	B (SE)	t	95% CI lower	95% CI upper	B (SE)	t	95% CI lower	95% CI upper	B (SE)	t	95% CI lower	95% CI upper	B (SE)	t	95% CI lower	95% CI upper
Peaks																
Husb Peak Affiliation	.01 (.20)	.05	-.32	.34	-.06 (.18)	-.36	-.35	.23	-.14 (.31)	-.46	-.66	.37	-.26 (.22)	-1.20	-.62	.10
Wife Peak Affiliation	.14 (.17)	.80	-.14	.41	.35 (.15)*	2.40	.11	.59	-.39 (.29)	-1.34	-.87	.09	-.36 (.19)	-1.90	-.67	-.05
Husb Peak Cooperation	-.13 (.20)	-.66	-.45	.20	-.59 (.17)**	-3.42	-.87	-.30	-.10 (.33)	-0.31	-.65	.44	.69 (.23)**	3.03	.32	1.07
Wife Peak Cooperation	-.18 (.18)	-1.00	-.49	.12	-.18 (.16)	-1.09	-.44	.09	.17 (.30)	.58	-.31	.66	.14 (.20)	.71	-.19	.48
Valleys																
Husb Valley Affiliation	.54 (.23)*	2.36	.17	.92	.09 (.21)	.46	-.24	.43	.82 (.42)*	1.94	.12	1.51	-.05 (.25)	-0.21	-.47	.36
Wife Valley Affiliation	-.24 (.21)	-1.14	-.59	.11	.13 (.18)	.69	-.18	.43	-.41 (.37)	-1.11	-1.02	.20	.07 (.25)	.30	-.33	.48
Husb Valley Cooperation	-.04 (.20)	-.20	-.37	.29	-.20 (.18)	-1.11	-.49	.10	.39 (.36)	1.09	-.20	.97	.06 (.23)	.24	-.33	.44
Wife Valley Cooperation	.07 (.20)	.03	-.33	.34	.28 (.18)	1.56	-.01	.57	-.24 (.34)	-.72	-.80	.31	-.43 (.23)	-1.90	-.80	-.06
Ends																
Husb End Cooperation	.40 (.19)*	2.16	.10	.70	.14 (.16)	.84	-.13	.41	.07 (.30)	.25	-.42	.57	-.10 (.20)	-0.49	-.44	.24
Wife End Cooperation	-.02 (.17)	-.11	-.31	.27	.13 (.15)	.84	-.12	.38	-.15 (.29)	-.53	-.62	.32	-.08 (.20)	-0.41	-.40	.24
Husb End Affiliation	-.05 (.22)	-.22	-.40	.31	-.15 (.19)	-.78	-.46	.16	-.15 (.35)	-.44	-.72	.41	.28 (.23)	1.21	-.10	.67
Wife End Affiliation	.08 (.18)	.43	-.21	.36	-.18 (.15)	-1.21	-.44	.07	.05 (.28)	.16	-.42	.51	.43 (.20)*	2.18	.11	.76
Mean Levels																
Husb Affiliation Mean	-.21 (.35)	-.61	-.78	.36	.44 (.30)	1.44	-.06	.93	-.76 (.58)	-1.30	-1.71	.20	.10 (.38)	.27	-.52	.72
Wife Affiliation Mean	.09 (.29)	.31	-.39	.57	-.07 (.25)	-.26	-.48	.35	.79 (.52)	1.51	-.07	1.64	-.06 (.33)	-.19	-.60	.47
Husb Cooperation Mean	-.06 (.34)	-.16	-.62	.51	.48 (.30)	1.61	-.01	.97	-.28 (.55)	-.52	-1.18	.62	-.87 (.38)*	-2.32	-1.50	-.25
Wife Cooperation Mean	.01 (.33)	.03	-.53	.55	-.28 (.29)	-.97	-.75	.19	.08 (.53)	.15	-.79	.94	.39 (.36)	1.08	-.20	.98

Note. p<.05, ** p<.01, *** p<.001.*

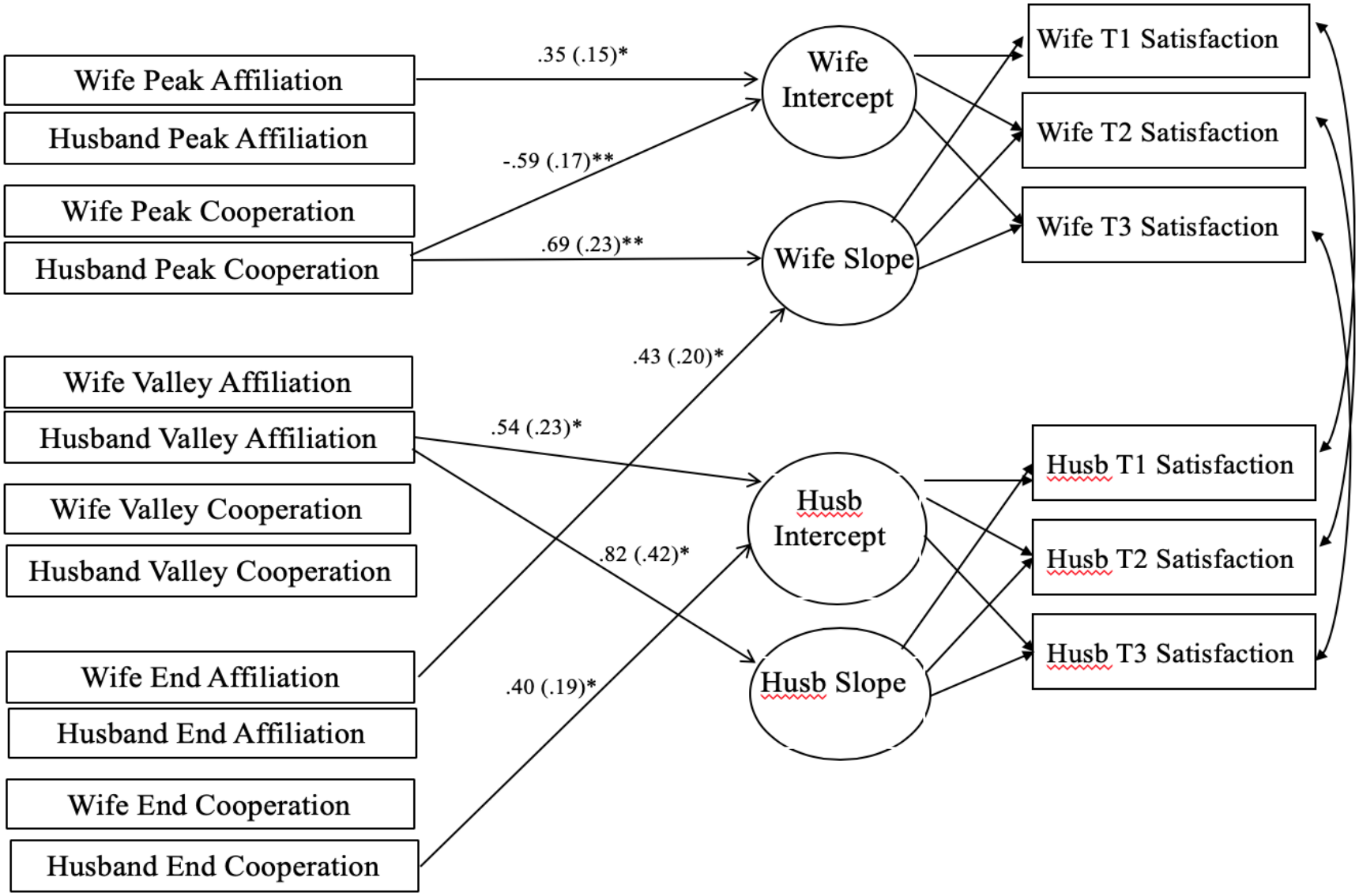

Figure 2. Maximum likelihood estimation of the model testing all peak, valley, and end effects simultaneously.
Note. Standardized estimates are presented. Only significant paths for peak, valley, and ends are shown. The current model controlled for mean levels of behavior, which are not shown here. The factor loadings for observed parameters are significant $p<.0001$. CFI = .99, RMSEA = .02.
. $p<.05$, ** $p<.01$, *** $p<.001$.*

GENERAL DISCUSSION

Intimate relationships are a key source of physical health, emotional wellbeing, and productivity for adults and children (e.g., Kiecolt-Glaser & Newton, 2001). Poor communication has been viewed as the key maintaining factor of relationship distress (Markman et al., 2010), and several couple interventions have been designed with the mission of enhancing communication skills in service of improving relationship quality (Jacobson & Christensen, 1998; Jacobson & Margolin, 1979). Yet despite decades of research, fundamental questions persist about the interpersonal behaviors that promote healthy relationships.

In an effort to clarify how communication comes to be linked with relationship satisfaction over time, the current dissertation offered an alternative model of communication that distinguishes two dimensions, one that is task-focused and one that is relationship-focused (i.e., cooperation/opposition and affiliation/disaffiliation). In addition to this novel framework, the current dissertation presented an accompanying observational coding system that measured behavior continuously, collecting moment-to-moment ratings, in order to examine how these two dimensions of behavior operate dyadically and dynamically to influence trajectories of relationship satisfaction. The two studies aimed to advance the field of communication research in a number of ways. First, Study 1 shifted away from the approach of overgeneralizing behavior as either positive or negative, and aimed instead at capturing the interpersonal nuance of opposition and cooperation. By testing effects of affiliation, cooperation, and combinations of the two, I predicted that the degree to which agreement or disagreement is affiliative dictates how successful these behaviors are in promoting relationship quality. Second, Study 1 moved beyond the individual level to the dyadic, sequential level of behavior, to test how couples' reciprocal patterns of interaction accounted for variability in relationship satisfaction over time.

Third, Study 2 extended beyond traditional methods of testing global levels of behavior by identifying the most intense moments of interactions and testing how these most meaningful behavioral instances are associated with relationship satisfaction longitudinally. Across these two studies, findings support the value of distinguishing between task-focused and relationship-focused components of communication, with consideration for dyadic, temporal factors. This notion challenges traditional approaches that categorize behaviors as "positive" and "negative" and study behaviors at the individual, global level, and helps to clarify how communication comes to be associated with relationship wellbeing over time. Below, I outline the main results from each study in further detail.

Summary of Key Results

In an effort to resolve ambiguity and move beyond the categorization of behaviors as "positive" or "negative", Study 1 introduced a new framework and accompanying coding system for studying communication that relied on two dimensions of behavior: cooperation and affiliation. I proposed that behavior that is more relationship-focused (i.e., affiliation), as opposed to problem-focused (i.e., cooperation) should be key to dictating how constructive or destructive communication is in promoting relationship quality. Moreover, I proposed that cooperation is only of consequence to relationship wellbeing to the extent that it is accompanied by affiliation or disaffiliation. Study 1 first tested these ideas at the global, individual level, relying on mean-level data aggregated across the entire interaction. Next, in an effort to align methodology more closely with phenomena, Study 1 exploited the continuous moment-to-moment behavioral data to investigate how dyadic reciprocal sequences and their duration predict relationship satisfaction cross-sectionally and longitudinally. Results revealed that, at the global, individual level, affiliation, on its own and in combination with cooperation, was

associated with spouses' relationship satisfaction cross-sectionally. Adding further clarity, dyadic, sequential analyses revealed that reciprocity of affiliative or disaffiliative behaviors for prolonged periods of time were diagnostic of relationship wellbeing initially and accounted for variability in trajectories over time. These results helped to refine understanding of the established behavioral reciprocity phenomenon (Margolin & Wampold, 1981), revealing that affiliative reciprocity is linked with relationship outcomes while cooperative reciprocity is not. Collectively, these results suggest that relationship-focused behaviors are essential to communication that promotes relationship wellbeing initially and over time. In Study 1, it is important to highlight that testing behavior at the global level based on aggregated means failed to account for variability in satisfaction trajectories, suggesting that studying behavior at this global, summary level is insufficient for understanding how communication is associated with changes in relationship quality over time. Study 2 aimed to address to this concern by identifying and testing the most meaningful moments of interaction as predictors of relationship satisfaction over time.

In an effort to clarify the most salient components of successful communication, Study 2 drew from the larger psychological literature, and identified the peak-end rule (Fredrickson, 2000; Kahneman, 2000) as an effective lens through which to study communication-satisfaction associations. Following the principle of the peak-end rule, Study 2 posited that partners' perceptions of relationship quality are consequences of particularly intense events during the interaction, rather than from the interaction globally. Study 2 identified and tested spouses' behavioral peaks, valleys, and ends on both dimensions (i.e., affiliation and cooperation) during a conflict interaction, predicting that these events would predict relationship outcomes over and above global levels of behavior. Taken together, results of Study 2 support

the merit of an event-based approach to studying communication, revealing that the peak and valley moments and concluding moments of interaction have significant consequences for relationship satisfaction over time over and above effects of global levels of behavior.

Despite the provocative results of this dissertation, important limitations constrain interpretation of these two studies. First, the current sample used in both studies does not include older couples or same sex couples, nor does it include very wealthy couples, thus limiting generalizability to these segments of the population. Second, this study was limited to observation of a conflict discussion. It is possible that results from both studies may differ depending on the nature of the interaction. For example, the various reciprocal patterns, peaks, and ends may occur at different rates and may function differently during more positively valenced tasks, such as social support interactions.

Implications and Future Directions

The results of this dissertation refine traditional approaches to studying behavior and clarify how communication functions to promote healthy relationships. These findings, collectively, cast doubt on traditional approaches that study behavior as categorically positive or negative and treat behavior as individual, global, and static. Rather, the current data suggest that communication is successful to the extent that it is affiliative, and that interaction involves dyadic, sequential processes as well as highs and lows of behavioral intensity, both of which have meaningful consequences for relationship satisfaction.

The current dissertation advances the field of relationships research in a number of ways. Across both dissertation studies, I aimed to take a top-down, theoretical approach to studying communication, and the collection of findings suggest that this approach was successful in resolving some ambiguity that has existed in the field. First, by considering the function of

communication, and selecting methodology and forming predictions based on this understanding of function, I uncovered new information about how couple interaction leads to different relationship outcomes. Specifically, the current findings clarify that communication is successful to the extent that it promotes closeness and connectedness during the interaction. Next, I included data that captured the dyadic patterning of couple interaction, elucidating the *processes* of communication that are more or less constructive in promoting healthy relationships, and these data further supported the assertion that affiliation is fundamental to successful communication. Finally, by examining the peaks, valleys, and ends of interaction, this work suggests that an event-based approach to studying communication may be more valuable than a global, summative approach.

Looking forward, the results of this dissertation suggest several future directions for research investigating couple communication. First, because the current studies relied on a novel observational coding system, it is essential that future research attempt to replicate all study findings. While the strength of interrater reliability and the predictive validity of the system lend confidence to the overall value of this new method, reliability and validity must be confirmed in other datasets. Second, future work should also assess the incremental validity of the current coding system by comparing its results to those obtained with more well-established observational coding systems. Ideally, future research should compare the results achieved by CODA with an established macro-coding system (rating global levels of behavior over the course of the entire interaction) and an established micro-coding system (rating behavior in frequent time intervals) in order to assess the relative merits of each system.

Future research would also benefit from including measurement of participant-rated post-discussion perceptions and experiences of the interaction. To extend the findings of Study 1,

future researching including measurement of post-discussion perceived problem resolution and perceived intimacy would allow for testing proposed mechanisms of change (i.e., do higher levels of cooperation and cooperative reciprocity indeed yield higher levels of problem resolution, while higher levels of affiliation yield higher levels of perceived intimacy). Because our current findings from Study 1 suggest that affiliative behavior significantly predicts relationship satisfaction while cooperative behavior, generally, does not, it would also be illuminating to investigate how any effect of affiliation on satisfaction is mediated by post-discussion perceptions of intimacy. Similarly, to extend the findings from Study 2, future research should test how post-discussion affect and post-discussion evaluations of relationship quality mediate associations between behavioral peaks/valleys/ends and relationship satisfaction longitudinally. This analysis would offer precision and clarity to the proposal that extreme moments of behavior change spouses' overall evaluations of the interactional experience, thereby leading to better or worse perceptions of relationship quality.

The results of this dissertation reveal new information about the constructive or destructive nature of communication processes and therefore have significant implications for treatment. A key message of Study 1 is that opposition is only harmful to the extent that it is also disaffiliative, and this finding suggests that prevention and intervention efforts may be more successful if they place an emphasis on teaching couples to approach conflict with the goal of maintaining warmth and connectedness to the partner even when expressing disagreement rather than teaching couples to solve problems and avoid blaming or demanding entirely. Meanwhile, results from Study 2 suggest that the particularly meaningful, intense events during interaction are the ingredients that dictate communication's success in promoting relationship wellbeing. In light of these findings, it may be valuable to shift away from teaching couples to minimize

negative behaviors and increase positive behaviors, and move towards teaching couples to modulate the intensity of behavior during conflict, such that they amplify their most positive moments, dampen their most negative moments, and aim to end their interactions positively.

Conclusion

Communication is a key a process in relationships that differentiates between different levels of satisfaction cross-sectionally and, in some instances, predicts changes in satisfaction over time, but inconsistencies in the literature indicated a need to improve the theoretical and methodological approaches to studying interpersonal behavior. The current dissertation aimed to bring theoretical clarity and methodological refinement to the study of couple communication by proposing a framework that distinguishes between two dimensions of behavior: cooperation and affiliation, thus disentangling the elements that make communication more or less successful in promoting relationship wellbeing. By considering the function of different domains of communication, examining the dyadic, temporal factors of interpersonal processes, and studying the most meaningful events during interaction, this dissertation elucidated how previously under-explored elements of communication account for variability in relationship outcomes. This work offers a foundation for future research that clarifies the mechanisms that link the two proposed functional domains of interpersonal behavior and the dyadic, dynamic, event-based factors of interaction to relationship outcomes over time, toward the ultimate goal of informing interventions designed to enhance communication skills in service improving relationship wellbeing.

References

Fredrickson, B. L. (2000). Extracting meaning from past affective experiences: the importance of peaks, ends, and specific emotions. *Cognition and Emotion, 14*(4), 577-606.

Jacobson N.S., Christensen A. (1998). Acceptance and change in couple therapy: A therapist's guide to transforming relationships. New York: Norton.

Jacobson, N. S., & Margolin, G. (1979). *Marital therapy: Strategies based on social learning and behavior exchange principles.* New York, New York: Brunner/Mazel.

Kahneman, D. (2000). Evaluation by moments: past and future. In D. Kahneman, & A. Tversky, *Choices, Values, and Frames.* New York: Cambridge University Press.

Kiecolt-Glaser, J.K., & Newton, T.L. (2001). Marriage and health: his and hers. *Psychological Bulletin, 127*(4), 472-503.

Margolin, G., & Wampold, B. E. (1981). Sequential analysis of conflict and accord in distressed and nondistressed marital partners. *Journal of Consulting and Clinical Psychology, 49*, 554–567.

Markman, H. J., Rhoades, G. K., Stanley, S. M., Ragan, E. P., & Whitton, S. W. (2010). The premarital communication roots of marital distress and divorce: The first five years of marriage. *Journal of Family Psychology, 24*(3), 289-298.