

Problem-Solving Skills and Affective Expressions as Predictors of Change in Marital Satisfaction

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Specific skills and affective expressions coded from the problem-solving interactions of 172 newlywed couples were examined in relation to 8-wave, 4-year trajectories of marital satisfaction. Effects varied as a function of whether husbands' versus wives' topics were under discussion and whether husbands' versus wives' satisfaction was predicted, but results indicate that skills, affect, and their statistical interaction account for unique variance in rates of change in marital satisfaction. The interaction between positive affect and negative skills was particularly robust, indicating that (a) low levels of positive affect and high levels of negative skills foreshadowed particularly rapid rates of deterioration and that (b) high levels of positive affect buffered the effects of high levels of negative skills. Findings suggest specific targets for intervention in programs for developing marriages.

Although research guided by social learning principles has established a clear association between observable problem-solving behaviors and spouses' concurrent reports of marital satisfaction, much less progress has been made in clarifying interactional antecedents of change in satisfaction (see Fincham & Beach, 1999). As a result, the empirical foundation for interventions designed to strengthen marital functioning and prevent adverse marital outcomes remains incomplete. Building on the well-established distinction between the verbal content and nonverbal tone of couples' communication, the present study addresses this problem by clarifying the extent to which communication skills,

affects, and their interplay foreshadow changes in marital satisfaction in the early years of marriage.

Skills, Affect, and Marital Satisfaction: Summary of Research

Conceptually, a distinction can be made between the degree of skill in spouses' verbal communications and the affective tone that accompanies them. Compared with emotional expressions, verbal skills are more volitional, are under greater conscious control, and take on greater variety. In the marital interactions studied typically

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in laboratory settings, skills are reflected primarily in the content of spouses' verbalizations whereas affect is conveyed via nonverbal cues, facial expressions, paralinguistic cues, and posture. Empirically, meaningful distinctions also can be drawn between skills and affect. In a classic cross-sectional study, Gottman (1979) demonstrated that distressed and nondistressed couples could be differentiated in the verbal content of their speaking turns when that content was accompanied by negative, but not neutral, affect. For example, these two groups of couples disagreed at the same rates with neutral affect, but distressed couples were 10 times more likely on average to express disagreement with negative affect. Besides demonstrating the cross-sectional superiority of affect over skills in differentiating happy and unhappy couples, this study shows that affect and skills are separable facets of marital communication. We adopt a similar distinction between skills and affect, in an effort to examine their relative and joint contributions to longitudinal changes in satisfaction.

Psychological studies of marital dynamics began with the premise, derived from social exchange theory (Thibaut & Kelley, 1959), that spouses' judgments of relationship satisfaction are determined by the rewards and costs associated with, and exchanged within, the marriage. Behaviorally oriented researchers defined rewards and costs operationally as the positive and negative valence of exchanged behaviors, and they demonstrated that distressed couples, compared with their nondistressed counterparts, were less likely to engage in positive or pleasing acts and more likely to engage in and reciprocate displeasing acts (e.g., Wills, Weiss, & Patterson, 1974). A large cross-sectional literature built on this basic finding (see Heyman, 2001), and behavioral skills training programs were designed with the expectation that greater competence in problem solving would alleviate (e.g., Jacobson & Margolin, 1979) and prevent (e.g., Markman, Floyd, Stanley, & Storaasli, 1988) marital dysfunction.

Surprisingly few longitudinal studies examine the unique role of couples' skills in managing marital conflict as predictors of change in marital satisfaction. In what is perhaps the strongest longitudinal study of problem-solving skills conducted to date, Kiecolt-Glaser, Bane, Glaser, and Malarkey (2003) collected biological and physiological measures from 90 newlywed couples during 30-min problem-solving interactions, which were later coded for specific positive and negative problem-solving skills. Stress hormones dominated the picture in predicting, over 10 years, which couples were divorced versus intact and which intact couples were satisfied versus dissatisfied. Among the intact couples, those who went on to become dissatisfied displayed more negative behavior initially than satisfied couples; these outcome groups did not differ initially on negative reciprocation or on positive skills. These findings lend support to the view that negative skills foreshadow marital dissatisfaction, in addition to raising the possibility that assessing the affective dimension of marital communication directly would capture some of the variance in outcomes explained by biological measures. Positive skills did not fare well in this study, though the possibility remains that low levels of positive skills become detrimental only when spouses also display low levels of positive affect or high levels of negative affect.

Studies undertaken within the early skill-based behavioral tradition soon gave rise to an appreciation for the power of spouses' emotional expressions in marital interaction (e.g., Gottman, 1979; Margolin & Wampold, 1981). Longitudinal studies of affect with

established couples yielded unexpected results (e.g., wives' anger proved beneficial over time; Gottman & Krokoff, 1989) and raised concerns regarding the use of distressed and/or established couples when examining antecedents of marital deterioration (see Bradbury, Cohan, & Karney, 1998). Four longitudinal studies have sidestepped this problem by using engaged or newlywed couples, and they yield a promising but complex pattern of results.

In their analysis of 91 couples assessed 6 weeks prior to marriage, Smith, Vivian, and O'Leary (1990) rated 10-min problem-solving interactions using 41 mood adjectives. Principal-components analysis produced two strong factors representing negative affect (e.g., "upset") and positive affect (e.g., "friendly"), and a weaker factor defined by, for example, sluggishness, low energy, and quietness; only the latter factor covaried with satisfaction 30 months later. Huston and Vangelisti (1991) used nine telephone interviews over 3 weeks to assess 106 newlywed spouses' reports of specific affectionate expressions, sexual activity, and negativity. Wives were less satisfied 2 years later to the extent that they reported less sexual activity and to the extent that they and their partners reported more negativity; no reliable predictors of husbands' satisfaction were identified.

In a study of 57 newlywed couples over 6 years, Gottman, Coan, Carrère, and Swanson (1998) coded specific positive and negative affects in problem-solving interactions and demonstrated that negative affect codes discriminated between divorced and intact couples but not between intact couples who became most and least satisfied. Neither anger nor reciprocation of strong negative affects predicted dissolution or satisfaction status. Specific positive affects—for example, humor and affection—were more evident initially among the intact than the divorced couples and among the satisfied than the dissatisfied couples. In contrast, Rogge and Bradbury (1999) collected self-reports of physical aggression and coded the 15-min problem-solving discussions of 57 newlywed couples, demonstrating that only the presence of physical aggression differentiated dissolved from intact couples over 4 years; higher levels of anger and contempt and lower levels of humor discriminated the intact distressed from the nondistressed couples.

Differing data collection and reduction procedures constrain any simple summary of these four studies, and, indeed, their findings do not converge on a consistent theme. Two studies (Huston & Vangelisti, 1991; Rogge & Bradbury, 1999) show that negative affect predicts later satisfaction, for example, but Gottman et al. (1998) find no such effect, despite the fact that Rogge and Bradbury (1999) and Gottman et al. used very similar coding systems. Smith et al. (1990) and Huston and Vangelisti (1991) found no effects for positive codes, but the picture here actually may be somewhat clearer: By coding discrete instances of specific behaviors, Gottman et al. and Rogge and Bradbury both demonstrated that higher rates of positive affect predicted higher levels of later satisfaction. This same approach to coding is adopted in the present study for positive and for negative affects. Another factor pertinent to interpreting the equivocal findings in this literature is that the contributions of affect may become evident only in the relative presence or absence of other observed behaviors, a possibility to which we now turn.

Although head-to-head comparisons of skill and affect codes may prove informative, a more accurate portrayal of behavioral predictors of relationship deterioration is likely to emerge from considering how each strengthens or weakens the effects of the

other. To our knowledge, there have been no analyses of the interactive effects of skills and affects on change in satisfaction. Additional findings from Smith et al.'s (1990) study, however, highlight the importance of looking beyond main effects when attempting to predict marital outcomes. After adjusting for main effects, Smith et al. found that conversations rated as high in positive affect were detrimental for marriage by 30 months when combined with high levels of negative affect and, surprisingly, were beneficial for the marriage when combined with high levels of the sluggishness factor. Analyses by Huston and Chorost (1994) on Huston and Vangelisti's (1991) sample also highlight the value of interactive effects, in this case demonstrating that the association between husbands' negativity and wives' declines in satisfaction are found only when husbands are relatively unaffectionate; high levels of negativity coupled with high levels of affection were not detrimental to the marriage. Though these two studies focus primarily on affective behaviors and yield rather different results, they nevertheless indicate that Affect \times Skill interactions may help pinpoint interpersonal antecedents of declines in marital satisfaction.

Hypotheses and Procedural Refinements

Three sets of hypotheses were tested. First, we examined concurrent associations among skill and affect codes to determine their shared variance. As the foregoing review suggests, spouses' skills and affects were expected to be separable but not necessarily orthogonal facets of communication. Consequently, we predicted that most correlations between skills and affects would be reliable but not of a magnitude that renders them statistically or conceptually redundant.

Second, we predicted change in satisfaction using (a) skill codes, controlling for affect codes, and (b) affect codes, controlling for skill codes. Though the independent effects of skills and affects have not been examined, the available evidence suggests that changes in satisfaction would be predicted by negative but not positive skills (Kiecolt-Glaser et al., 2003), by negative affect (Huston & Vangelisti, 1991; Rogge & Bradbury, 1999), and by positive affect (Gottman et al., 1998; Rogge & Bradbury, 1999).

Third, we examined statistical interactions between all four combinations of positive and negative skill codes and positive and negative affect codes. Prior studies indicate that interactions of positive and negative codes would be most potent (Huston & Chorost, 1994; Smith et al., 1990), hence we predicted that couples would decline most rapidly in satisfaction to the extent that their interactions are characterized by high levels of negative skills and low levels of positive affect and by low levels of positive skills and high levels of negative affect. We advanced these hypotheses tentatively but with the expectation that, for example, low levels of humor and affection would exacerbate the effects of disagreement and criticism whereas high levels of humor and affection might lessen the effects of these negative skills.

The present study incorporates several procedural refinements. First, data were collected from a relatively large sample of couples, all at the newlywed stage of their first marriage and varying widely in ethnicity. Second, because prior studies show that husbands' and wives' behavior differs as a function of whether they or their partner is raising the topic of marital disagreement (Heavey, Layne, & Christensen, 1993), couples were observed during sep-

arate husband- and wife-initiated conversations. Third, to address the concern that predictive effects of behavioral codes are confounded by the severity of the problems that different couples discuss, couples' severity ratings were examined and controlled. Finally, because most longitudinal studies are limited in their ability to estimate change in satisfaction owing to their reliance on using just one follow-up assessment (Karney & Bradbury, 1995a, 1995b), data were collected twice annually over 4 years. The resulting marital satisfaction trajectories were defined at the within-subject level, yielding for each spouse a value that represents his or her mean level of marital satisfaction over time and a slope value that represents his or her rate of change in satisfaction over time (Bryk & Raudenbush, 1992). Positive and negative skills and affects and their interactions were then examined in a series of analyses as predictors of levels and, more importantly, slopes.

Method

Participants

Participants were recruited from marriage licenses filed in Los Angeles County between May 1993 and January 1994; couples were sent letters inviting them to participate in a longitudinal study of newlywed marriage. Of the 3,606 letters that were sent, 637 couples (17.8%) expressed interest in participating, 41 letters were not deliverable (1.1%), and 2,928 letters (81.2%) went unanswered. The 17.8% response rate is similar to that of other studies recruiting married couples from public records (e.g., 18% in Kurdek, 1991). Relative to the 637 couples who responded to the letter, the 2,928 couples who did not respond were less likely to cohabitate premaritally (35% vs. 43%; effect size $r = .11$), were in school fewer years (husbands: 14.6 years vs. 15.2 years, effect size $r = .18$; wives: 14.5 years vs. 15.4 years, effect size $r = .29$), were younger (wives only: 26.2 years vs. 26.6, effect size $r = .07$), and were in lower status jobs (husbands' effect size $r = .20$; wives' effect size $r = .18$). Couples expressing interest in participating were screened by telephone. To be eligible, spouses had to be in their first marriage. They also had to be 18 years of age or older; have at least a 10th grade education; be able to speak, read, and write English; have no children; and have no plans to leave the Los Angeles area. Wives had to be under 35 years of age to allow for the possibility that all couples could become parents during the project. The first 172 couples meeting the eligibility criteria and who kept their laboratory appointment comprised the sample. Nearly all initial laboratory sessions took place in the first 6 months of marriage. Twenty-two couples divorced over 4 years; we focus here on the prediction of satisfaction trajectories for the intact couples and for the divorced couples prior to their dissolution.¹

Wives averaged 26.0 ($SD = 3.4$) years of age, 16.2 ($SD = 3.4$) years of education, and a median annual income between \$11,000 and \$20,000. Sixty-one percent of the wives were Caucasian, 15% were Asian American–Pacific Islander, 5% were African American, 16% were Latina–Chicana, 2% were Middle Eastern, and 1% self-identified as “other.” Husbands averaged 27.6 ($SD = 3.9$) years of age, 15.6 ($SD = 2.2$) years of education, and a median annual income between \$21,000 and \$30,000. Sixty-seven percent of the husbands were Caucasian, 13% were Asian American–Pacific Islander, 4% were African American, 15% were Latino–Chicano, 1% were Middle Eastern, and none self-identified as “other.” These data compare favorably with the 1990 census racial breakdown of Los Angeles County.

¹ Although data from this sample have been published elsewhere, this is the first article from the study relating observational data on marital problem solving with marital outcomes.

Procedure

Spouses independently completed questionnaires (including demographic forms and measures of marital satisfaction and marital problems) prior to and during a 3-hr laboratory session and were observed discussing two marital difficulties. Spouses reported on their marital satisfaction seven more times for a total of eight assessments over the first 4 years of marriage.

Behavioral assessment. On the marital problem inventory (described below), each spouse identified a source of tension they experienced in the marriage. Couples then discussed these two problems separately in a randomly predetermined order for 10 min apiece. In rare instances when spouses chose the same topic for discussion, that topic was assigned to the spouse whose topic was chosen to be first and the other spouse's second choice of topic was then used for the second discussion. At the beginning of each conversation, couples were instructed to "discuss the topic for 10 min and try to work toward a mutually satisfying solution." Conversations were videotaped, and couples were paid \$75 on completion of the session.

Self-report assessments. In the second assessment, 6 months after the laboratory session, couples were mailed a packet of questionnaires. The third assessment took place prior to a laboratory session 6 months later, and the remaining five assessments of satisfaction were again conducted via mail at 6-month intervals. For all assessments, spouses were instructed in a telephone call and in a cover letter to respond without consulting with their partner. Couples were paid \$25 for questionnaires completed via mail and \$75 for the second laboratory session.

Questionnaires

Marital satisfaction was assessed with the 15-item Marital Adjustment Test (MAT; Locke & Wallace, 1959). The MAT assesses global evaluations of the marriage, marital cohesion, degree of agreement in various domains, and retrospections on whether partners would marry their spouse again. The MAT was scored as originally suggested (without weighting), thus scores range from 2 to 158, with higher scores indicating greater satisfaction. The MAT discriminates between nondistressed spouses and spouses with documented marital problems and yields a split-half reliability estimate of .90 (Locke & Wallace, 1959).

Marital problems were assessed with the Inventory of Marital Problems (IMP; Geiss & O'Leary, 1981), where spouses indicate on an 11-point scale (1 = *not a problem*, 11 = *major problem*) the extent to which they encounter difficulties in each of 19 areas (e.g., money, in-laws, sex). The IMP was used to identify topics for the problem-solving discussions, as outlined above, and the rating associated with the topic that was discussed was used in data analyses to control for problem severity when predicting marital outcomes from the behavioral variables.

Behavioral Observation

Two separate coding systems and two independent coding teams were used to quantify the skills and affects displayed in the 344 10-min problem-solving discussions. Particular attention was given to ensuring that definition and identification of codes in one domain were independent of content and cues in the other domain. For both coding systems, 20% of the interactions were double coded to assess interrater reliability.

Affect coding. Displays of specific affects were coded using the Specific Affect (SPAFF) Coding System Version 1.0 (Gottman & Krokoff, 1989), modified such that two codes, interest/curiosity and anticipation/surprise/excitement/enjoyment/joy, were combined a priori into one code labeled *interest*. Following SPAFF procedures, trained coders were instructed to emphasize facial expressions, posture, gestures, and voice tone and pitch when coding affect; verbal content was not sufficient by itself for coding a specific affect. The 10-min discussions were divided into 5-s units to allow for the possibility that multiple emotions could occur in a speaking turn. Each unit was coded as displaying one of five negative affects (anger,

contempt, whining, sadness, or anxiety), one of three positive affects (humor, affection, or interest), or neutral affect (i.e., indiscernible or subthreshold). Whining was dropped from analyses because reliability for this code was relatively low. Sadness and anxiety were dropped from analyses because they were observed infrequently. Factor analysis of a rating system based on the SPAFF system indicated that all three of the positive codes load on the same factor and that anger and contempt load on the same factor (e.g., Johnson, 2002). Thus, the affect variables analyzed here are positive affect (defined as the sum of humor, affection, and interest) and negative affect (defined as the sum of anger and contempt). The analysis of interobserver reliability yielded intraclass correlation (ICC) coefficients of .66 (husbands' negative affect), .83 (husbands' positive affect), .91 (wives' negative affect), and .68 (wives' positive affect). All ICC coefficients were significantly different from 0.00 ($p < .01$), indicating acceptable interobserver agreement.

Skill coding. The Kategoriensystem für Partnerschaftliche Interaktion (KPI; Hahlweg et al., 1984) was used to code the skills that spouses displayed in the problem-solving interactions. The KPI does permit coding of positive and negative affect, but this part of the system was replaced by the more specific affects defined by the SPAFF. The KPI consists of 27 codes derived from the research literature on communication skills training and behavioral marital therapy (see Hahlweg et al., 1984). It is used to code each speaking turn in an interaction and distinguishes reliably between distressed and nondistressed couples (e.g., Hahlweg et al., 1984). On the basis of factor analyses of the KPI codes that yielded positive and negative composites (e.g., Hills & Johnson, 2000), the skill codes in the present study were reduced to a positive skills variable (defined as the sum of direct expression of feelings, direct expression of wishes and needs, direct expression of attitudes and opinions, constructive solution, compromise, paraphrasing, interested questions, feedback, understanding the partner, direct agreement, accepting responsibility, agreeing, problem description, relevant questions, setting the course of the conversation and clarification, and theme suggestion) and a negative skills variable (defined as the sum of specific critique, devaluation of partner, justification of own behavior, denial of responsibility, demands, apparent suggestions for solution, disagreement, yes-but sentences, declining remarks, and blocking off). Analysis of interobserver reliability yielded ICC coefficients of .62 (husbands' negative skills), .84 (husbands' positive skills), .75 (wives' negative skills), and .90 (wives' positive skills). All coefficients differed reliably from 0.00 ($p < .01$), indicating acceptable interobserver agreement.

Results

Preliminary Analyses

Descriptive statistics. Descriptive statistics for the marital satisfaction data are shown in Table 1. Of the 344 spouses participating, trajectories could not be estimated for 10 (5 couples) because they provided fewer than three data points; 4 of these couples dissolved their marriage before the third assessment and the 5th provided data only at the first and last assessments. Three couples had data missing from one spouse so that trajectories could be estimated only for one partner. Of the 344 spouses, 331 (96%) provided data for the present analyses.

Table 2 presents descriptive statistics for the skill codes and the affect codes, distinguished by which partner displayed them and in which discussion. The skill and affect codes were positively skewed and thus were subjected to a logarithmic transformation. All subsequent analyses use the improved transformed distributions.

Comparison of husbands' and wives' behavior. Eight two-tailed dependent-samples *t* tests were computed, each comparing husbands' and wives' behavior for each of the four main codes

Table 1
Descriptive Statistics for Marital Satisfaction (Marital Adjustment Test) Scores Across All Assessments

Variable	Time 1	Time 2	Time 3	Time 4	Time 5	Time 6	Time 7	Time 8
Husbands								
<i>M</i>	126.7	122.6	123.5	120.9	119.7	119.9	117.1	118.1
<i>SD</i>	16.9	20.5	20.4	20.6	22.8	22.0	24.1	22.9
<i>n</i>	172	162	163	135	134	135	121	127
Wives								
<i>M</i>	130.1	126.3	126.2	126.0	122.8	121.5	120.6	118.3
<i>SD</i>	16.1	17.7	19.3	18.3	20.6	21.1	23.8	21.4
<i>n</i>	172	162	163	138	136	141	124	128

separately in the husband- and wife-selected interactions (see Table 2). A Bonferroni correction for experiment-wise Type I error ($\alpha_{ew} = .05$) resulted in an individual α of .006. Two of these tests were significant: Wives displayed significantly more negative affect than husbands in husband-selected topics and in wife-selected topics.

Association of behaviors across husband- and wife-selected topics. Correlations and *t* tests were computed with the four behavioral variables to examine the degree to which spouses' behaviors were comparable across the two discussions. Eight correlations were computed—four for husbands and four for wives—and all were significant (all *ps* < .01, two-tailed; range = .39–.58),

Table 2
Descriptive Statistics, Between-Spouse Comparisons, and Between-Topic Comparisons for Skill and Affect Codes

Variable	Skill code		Affect code	
	Positive	Negative	Positive	Negative
Husband-selected topics				
Husband behavior				
<i>M</i>	236.5	42.3	3.3	5.3
<i>SD</i>	78.3	41.7	4.0	10.7
Wife behavior				
<i>M</i>	229.5	42.7	3.3	9.5
<i>SD</i>	77.2	41.5	4.4	14.4
Difference (<i>t</i>)	0.7	0.2	−0.1	−5.4***
Wife-selected topics				
Husband behavior				
<i>M</i>	226.4	46.0	3.8	5.9
<i>SD</i>	77.2	49.8	5.4	11.9
Wife behavior				
<i>M</i>	235.0	41.0	4.4	9.3
<i>SD</i>	89.1	39.7	5.9	16.0
Difference (<i>t</i>)	−0.8	0.2	−2.7**	−5.4***
Topic differences				
Husband behavior (<i>t</i>)	1.7	0.0	0.1	−0.1
Wife behavior (<i>t</i>)	−0.9	−0.0	−1.5	0.4

Note. Data are from 172 husbands and 172 wives at Time 1. After a Bonferroni correction, only the results for negative affect remained statistically reliable (see the text).
** *p* < .01. *** *p* < .001.

with no discernible pattern by code or by gender. For each code, dependent-samples *t* tests were computed to examine the extent to which spouses displayed different levels of behavior across the two topics; this was done separately for husbands and for wives. The results, shown in Table 2, reveal no reliable differences in husbands' behavior or in wives' behavior as a function of whether they or their partner identified the topic for discussion. Although these analyses indicate moderate overlap across husband- and wife-selected topics, the distinction between the two topics was retained to allow for the possibility that behaviors in the two discussions might be differentially predictive of changes in satisfaction.

Association of skill codes and affect codes. Correlations were computed to examine the extent to which skill codes and affect codes were distinguishable empirically, separately for husbands and wives, in each of the two discussions. These correlations are shown in Table 3. The patterning of correlations does not appear to differ when husbands and wives are compared or when husbands' and wives' topics are compared. Averaging over actors and topics, the mean correlation between negative skills and negative affect is .49 and the mean correlation between positive skills and positive affect is .18; these two values differ reliably when compared using the Dunn and Clark (1971) transformation procedure ($z = 2.9, p < .01$). The off-diagonal elements are, of course, smaller in magnitude and inverted. Again averaging over actor and topic, the mean correlation between positive affect and negative skills is $-.22$; the mean correlation between negative affect and positive skills is $-.19$. Thus, although there is some overlap in the affect and skill codes, particularly when both have a negative valence, they are sufficiently distinct to be examined as separate variables.²

Values in Table 3 also show the correlations between husbands' affect codes and wives' affect codes and between husbands' skill codes and wives' skill codes in the husband-selected and wife-selected topics. These correlations are important because they demonstrate that within a discussion, there are robust correlations

² One other pattern of interest is that the within-spouse correlation between positive affect and positive skills is only significant when discussing the topic of the other spouse (e.g., wives' positive skills and positive affect were correlated in husband-selected topics but not in wife-selected topics). Although the differences between these correlations are not significant, the reliability of the pattern across both spouses is noteworthy.

Table 3
Correlations Among Husbands' and Wives' Skill and Affect Codes, Observed in Discussions of Marital Topics Selected by Husbands (Above the Diagonal) and by Wives (Below the Diagonal)

Variable	1	2	3	4	5	6	7	8
1. Husband PA	—	-.24**	.12	-.19*	.64***	.11	.06	-.15*
2. Husband NA	-.23**	—	-.20*	.46***	-.30***	.60***	-.25**	.39***
3. Husband PS	.24**	-.25**	—	-.23**	.08	-.31***	-.29***	-.39***
4. Husband NS	-.21**	.50***	-.29***	—	-.33***	.45***	-.36***	.55***
5. Wife PA	.80***	-.25**	.23**	-.23**	—	-.24**	.24**	-.19*
6. Wife NA	-.34***	.69***	-.29***	.49***	-.34***	—	-.19*	.51***
7. Wife PS	.06	.21**	-.34***	-.34***	.11	-.12	—	-.24**
8. Wife NS	-.23**	.45***	-.35***	.60***	-.27***	.50***	-.17*	—

Note. Data are from 172 husbands and 172 wives at Time 1. PA = positive affect; NA = negative affect; PS = positive skills; NS = negative skills.

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

between husbands' and wives' positive affects (.80 and .64, in the wives' and husbands' topics, respectively), negative affects (.69 and .60), positive skills (-.34 and -.29), and negative skills (.60 and .55). These correlations serve as an important reminder that behaviors exchanged by interacting partners are not independent and that interpretation of findings should take into account the dyadic context in which these variables were collected.³

Associations between affect, skills, and concurrent marital satisfaction. Correlations were conducted between the four behavior codes and marital satisfaction, before and after controlling for problem severity. Controlling for problem severity in correlations between behaviors and satisfaction consistently reduced the magnitude of correlations, hence the partial correlations are emphasized here. As in prior studies (e.g., Karney & Bradbury, 1997), associations between observed behavior and newlywed satisfaction tend to be nonsignificant or relatively weak. Twenty-one of the 32 partial correlations examined were nonsignificant, and 9 of the 11 significant correlations were less than or equal to .20. There was no obvious patterning in the significant partial correlations as a function of which spouse selects the topic for discussion or provides the satisfaction data. There is a tendency, however, for affect codes to yield more reliable correlations than skill codes; for example, husbands and wives are both less satisfied to the extent that wives display more negative affect (during discussion of husband-selected topics) and less positive affect (during discussion of wife-selected topics).

Preliminary Growth Curve Analyses

Baseline model. The linear model that was tested examined the slope of each spouse's marital satisfaction over the first 4 years of marriage and the mean of the within-subject satisfaction scores for each spouse. In other words, the model may be described as a within-subject regression of each spouse's satisfaction scores onto a line with a constant, a slope, and an error coefficient. This model can be specified in the following function:

$$Y_{ij} = \beta_1(\text{husband}) + \beta_2(\text{wife}) + \beta_3(\text{husband time}) + \beta_4(\text{wife time}) + r, \quad (1)$$

where Y_{ij} is the marital satisfaction of an individual spouse of couple j at time i ; β_1 is the level for the husband of couple j , that

is, the mean satisfaction score of the husband of couple j across assessments; β_2 is the level for the wife of couple j , that is, the mean satisfaction score of the wife of couple j across assessments; β_3 is the slope for the husband of couple j , that is, the rate of change in satisfaction scores over time for the husband of couple j ; and β_4 is the slope for the wife of couple j , that is, the rate of change in satisfaction scores over time for the wife of couple j .

In estimating this model, time was measured in days since the couple's wedding and divided by 30 so that the unit of time was analogous to a month and was centered to represent the midpoint of the assessments for each spouse. Equation 1 follows the procedure described by Raudenbush, Brennan, and Barnett (1995) and allows the parameters of both spouses to be estimated simultaneously. Each parameter of Equation 1 includes a constant and a unique error term, such that

$$\beta_1 = \gamma_{10} + v_1, \quad (2)$$

$$\beta_2 = \gamma_{20} + v_2,$$

$$\beta_3 = \gamma_{30} + v_3, \text{ and}$$

$$\beta_4 = \gamma_{40} + v_4.$$

Using hierarchical linear modeling (HLM) software (HLM 5; Raudenbush, Bryk, Cheong, & Congdon, 2000), the baseline model (i.e., Equation 1) was estimated successfully, providing

³ Although three of these pairs of correlations reflect the expected direct associations between husbands' and wives' behaviors, one pair of correlations (for positive skills) is in the unexpected direction. In wives' and husbands' topics, higher levels of positive skills by one partner corresponded with lower levels of positive skills by the partner. We are hesitant to make much of these correlations, however they may indicate that husbands decline in displays of positive skills and wives increase in positive skills as they go from the husbands' to the wives' tasks; that is, spouses might display fewer positive skills when they are responding to concerns raised by the partner. The means for positive skills shown in Table 2 are consistent with this possibility, particularly in that the between-topic difference for husbands approached statistical significance. Though the explanation for these correlations is preliminary, they appear valid and lend support to the distinctions between skills and affects and between positive and negative skills.

reliable estimates of all model parameters. In growth curve analysis, reliability is defined as the proportion of variance in each parameter that can be treated as meaningful (i.e., true) variance. This definition of reliability is mathematically and conceptually distinct from cross-sectional definitions of reliability, such as scale reliability (e.g., split-half or coefficient alpha) and interrater reliability (e.g., ICC coefficient). It is not expected to be as high as scale reliability estimates (Bryk & Raudenbush, 1992). The reliability coefficients of the levels, denoting the mean level of satisfaction for each spouse across assessments, were .84 for husbands and .82 for wives. The reliability of the slope estimates, denoting rate of change in satisfaction over time, were .60 for husbands and .58 for wives. HLM analyses estimating the impact of behaviors on levels and slopes only used the proportion of variance in the parameters indicated by the reliability estimates for coefficient estimation.

Prior to analyzing the influences of predictors and interactions of predictors on the trajectories, the parameters of the trajectories of marital satisfaction are described. The mean intercepts of the trajectories, which represent the mean levels of marital satisfaction over 4 years because the data were centered, were 120.5 ($SD = 16.5$) for husbands and 124.6 ($SD = 15.4$) for wives. Levels tend to be high, indicating that the sample was relatively satisfied over the 4-year period. However, mean slope values are significantly less than zero, indicating that satisfaction declined with time, $t(169) = -6.3$ and -8.1 , for husbands and wives, respectively, $p < .01$. On average, husbands' MAT scores decreased .25 points per month ($SD = .40$) or 12 points in 4 years, and wives' MAT scores decreased .30 points per month ($SD = .38$) or 14.4 points in 4 years. Understanding this metric is important for interpreting interactions presented later, which demonstrate that some combinations of affect and skill codes result in far greater declines in satisfaction. Chi-square statistics ($dfs = 169$), ranging from 451.1 to 1,174.2 (all $ps < .01$), indicate that there is sufficient variance in all parameters to support a linear model of change in satisfaction. Higher levels of satisfaction are associated with slower rates of decline in satisfaction for husbands ($r = .40$) and for wives ($r = .52$).

The possibility that marital satisfaction changed in a nonlinear fashion, with more rapid declines early on followed by a leveling off at a lower level, was explored by including a quadratic term in the model. A quadratic term would result from squaring the time parameter already entered. Findings obtained with three criteria—the reliability coefficients, the effect coefficients and their difference from zero, and the variance components and their difference from zero—all demonstrated that the linear model, and not the curvilinear model, best represents change in satisfaction in the present sample; the linear model is tested below.

Four predictor variables were included in each of the four parameters listed in Equation 2 that entered into Equation 1: the severity rating of the problem under discussion, either a positive or negative affect variable, either a positive or negative skill variable, and the product of the affect and skill variables entered in the two previous steps.⁴ These four parameters become part of Equation 1 once they are entered into Equation 2 as follows:

$$\beta_1 = \gamma_{10} + \gamma_{11}(\text{severity}) + \gamma_{12}(\text{affect}) + \gamma_{13}(\text{skill}) \\ + \gamma_{14}(\text{affect} \times \text{skill}) + v_1, \quad (3)$$

$$\beta_2 = \gamma_{20} + \gamma_{21}(\text{severity}) + \gamma_{22}(\text{affect}) + \gamma_{23}(\text{skill}) \\ + \gamma_{24}(\text{affect} \times \text{skill}) + v_2,$$

$$\beta_3 = \gamma_{30} + \gamma_{31}(\text{severity}) + \gamma_{32}(\text{affect}) + \gamma_{33}(\text{skill}) \\ + \gamma_{34}(\text{affect} \times \text{skill}) + v_3, \text{ and}$$

$$\beta_4 = \gamma_{40} + \gamma_{41}(\text{severity}) + \gamma_{42}(\text{affect}) + \gamma_{43}(\text{skill}) \\ + \gamma_{44}(\text{affect} \times \text{skill}) + v_4.$$

By entering the terms in this manner, each is used to estimate each of the parameters of marital satisfaction noted in Equation 1.

Problem severity ratings and trajectories of marital satisfaction. Associations between mean levels of marital satisfaction and problem severity are strong, indicating that couples discussing more severe problems reported lower mean satisfaction scores (effect sizes range from $r_{\text{effect}} = .25$ to $r_{\text{effect}} = .49$; mean $r_{\text{effect}} = .40$). Associations between slopes of marital satisfaction and problem severity were weak (effect sizes range from $r_{\text{effect}} = .00$ to $r_{\text{effect}} = .15$; mean $r_{\text{effect}} = .08$). These results support the validity of the severity measure, the validity of the procedure used to elicit marital conversations, and the need to control for problem severity.

Satisfaction Levels: Prediction From Skills, Affects, and Their Interactions

The effect sizes shown in Table 4 indicate the extent to which skill and affect codes are associated with mean levels of marital satisfaction over time. Each skill or affect code in the table is listed with the codes and interaction of codes that were controlled in that particular analysis. These data indicate that (a) both skill codes and both affect codes appear as significant predictors of husbands' and wives' levels; (b) all predictions are in the expected direction, such that positive skills and positive affects predict higher levels and negative skills and negative affects predict lower levels; and (c) no interactions appear in the table, indicating that all interactions between skill and affect codes fail to strengthen prediction beyond the main effects of those codes. More substantively, the results shown in Table 4 indicate that effects are at least twice as likely when predicting the level of one spouse from behaviors observed in the partner's task than when predicting a spouse's level from behaviors observed in their own tasks. Specifically, significant effects are more likely when predicting husbands' levels during discussion of wives' topics (compared with predicting husbands' levels during discussion of husbands' topics) and when predicting wives' levels during husbands' topics (compared with predicting wives' levels during wives' topics). This indicates, for example, that how a couple addresses the topic raised by the husband predicts the wife's mean level of satisfaction over 4 years. To continue the example, more negative affect and negative skills, and less positive affect and positive skills, displayed by husbands and by wives during the husbands' task correspond with lower levels of satisfaction reported by wives.

⁴ Affect and skill variables were centered prior to multiplication as recommended by Aiken and West (1991).

Table 4
Significant Effect Sizes Relating Skill and Affect Codes, Observed in Husband- and Wife-Selected Discussion Topics, to Husbands' and Wives' Marital Satisfaction Levels

Variable	Positive effects	Negative effects
Husbands' satisfaction levels		
Husband behavior		
Husband topic	.15 PA (PS, PA × PS)	-.26 NS (PA, PA × NS)
Wife topic	.19 PA (PS, PA × PS) .16 PA (NS, PA × NS)	-.21 NS (PA, PA × NS) -.19 NA (PS, NA × PS) -.15 NS (NA, NA × NS)
Wife behavior		
Husband topic		-.28 NA (PS, NA × PS) -.19 NS (PA, PA × NS)
Wife topic	.18 PA (PS, PA × PS) .18 PA (NS, PA × NS) .17 PS (NA, PS × NA) .16 PS (PA, PA × PS)	
Wives' satisfaction levels		
Husband behavior		
Husband topic	.28 PS (PA, PA × PS) .25 PS (NA, NA × PS) .23 PA (PS, PA × PS) .23 PA (NS, PA × NS)	-.21 NS (PA, PA × NS) -.18 NS (NA, NA × NS)
Wife topic	.28 PA (PS, PA × PS) .27 PA (NS, PA × NS)	
Wife behavior		
Husband topic	.16 PA (PS, PA × PS)	-.25 NA (PS, NA × PS) -.23 NS (PA, PA × NS) -.15 NA (NS, NA × NS)
Wife topic	.26 PA (PS, PA × PS) .25 PA (NS, PA × NS)	

Note. Entries show effect size r values, the specific behavior associated with level of satisfaction, and control variables (in parentheses). PA = positive affect; PS = positive skills; NS = negative skills; NA = negative affect.

Satisfaction Slopes: Prediction From Skills, Affects, and Their Interactions

To what extent do the skill and affect codes displayed in discussions selected by husbands and wives predict rates of change in spouses' satisfaction over time (controlling for levels and for the partner's change in satisfaction)? Table 5 presents the effect sizes that address this question. The results indicate that (a) both skill codes and both affect codes appear as significant predictors of husbands' and wives' slopes and (b) all predictions are in the expected direction, such that positive skills and positive affects predict slower rates of change and negative skills and negative affects predict faster rates of change. Unlike results obtained for levels, however, main effects and interactions contribute to the prediction of husbands' and wives' slopes; each is addressed in turn.

Main effects. Table 5 suggests different predictive patterns as a function of whether wives' or husbands' topics are under discussion. Positive affect displayed by either partner is the sole predictor of change in wives' satisfaction during discussions of wives' topics: When husbands and wives discuss wives' concerns with relatively little humor and affection, wives' satisfaction de-

clines at a relatively fast rate, even after controlling for positive and negative skills. None of the behaviors displayed by either partner during discussion of wives' topics are related to rates of change in husbands' satisfaction.

A different pattern arises when the behaviors displayed in discussion of husbands' topics are considered. Here, husbands' rates of change in satisfaction are greater to the extent that (a) they display fewer positive skills and more negative skills and (b) their partners display less positive affect, more negative affect, and more negative skills. In these same discussions, wives' rates of change in satisfaction are greater to the extent that (a) they display more negative affect and more negative skills and (b) their partners display fewer positive skills. Stated differently, these findings show that both partners' slopes are reliably predicted by husbands' skills and by wives' skills and affect during discussion of husband topics.

Interactions. Interpretation of the foregoing main effects must be qualified by the seven significant interactions shown in Table 5. Four of these interactions involve the combination of positive affect and negative skills, which, remarkably, represent husbands' and wives' behaviors, observed during discussion of husbands' and wives' discussions, and predict husbands' and wives' slopes. We begin with an analysis of this combination of codes before turning to the remaining significant interactions.

Figure 1 (A–D) depicts the interactions between positive affect and negative skills. The figure shows four values of the criterion

Table 5
Significant Effect Sizes Relating Skill and Affect Codes, Observed in Husband- and Wife-Selected Discussion Topics, to Husbands' and Wives' Marital Satisfaction Slopes

Variable	Positive effects	Negative effects
Husbands' satisfaction slopes		
Husband behavior		
Husband topic	.15 PS (NA, NA × PS) .15 PS (PA, PA × PS)	-.16 NS (PA, PA × NS)
Wife topic		
Wife behavior		
Husband topic	.16 PA (PS, PA × PS)	-.22 NS (PA, PA × NS) -.21 NA (PS, NA × PS)
Wife topic	.16 PA × NS (PA, NS)	-.18 NA × PS (NA, PS)
Wives' satisfaction slopes		
Husband behavior		
Husband topic	.19 PS (PA, PA × PS) .17 PS (NA, NA × PS) .15 PA × NS (PA, NS)	-.17 PA × PS (PA, PS)
Wife topic	.19 PA (PS, PA × PS) .19 PA (NS, PA × NS) .15 NA × PS (NA, PS)	
Wife behavior		
Husband topic	.19 PA × NS (PA, NS)	-.22 NA (PS, NA × PS) -.19 NS (NA, NA × NS)
Wife topic	.22 PA × NS (PA, NS) .19 PA (NS, PA × NS) .18 PA (PS, PA × PS)	

Note. Entries show effect size r values, the specific behavior associated with slope of satisfaction, and control variables (in parentheses). Interactions appear in bold. PS = positive skills; NA = negative affect; NS = negative skills; PA = positive affect.

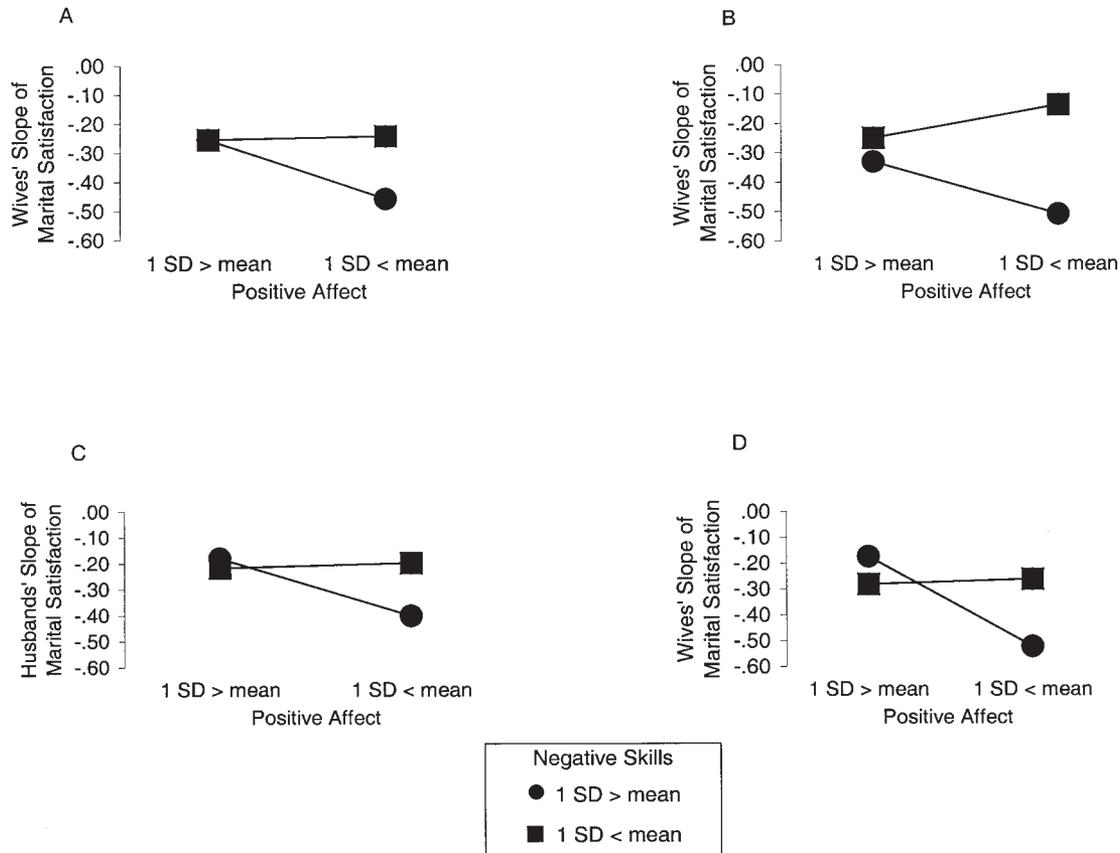


Figure 1. Interactions between positive affect and negative skills. Panels vary as a function of whether husbands' versus wives' behavior is represented, whether husbands' versus wives' topics are under discussion, and whether changes in husbands' versus wives' satisfaction are predicted, as follows: (A) husbands' behaviors during discussion of husbands' topics, predicting changes in wives' satisfaction, (B) wives' behaviors during discussion of husbands' topics, predicting changes in wives' satisfaction, (C) wives' behaviors during discussion of wives' topics, predicting changes in husbands' satisfaction, and (D) wives' behaviors during discussion of wives' topics, predicting changes in wives' satisfaction.

variable that are predicted by substituting values for the observations of affect and skills that are either one standard deviation above the mean or one standard deviation below the mean into the relevant HLM equation (see Aiken & West, 1991). In other words, four values of the criterion variable (e.g., slope of marital satisfaction for wives) were graphed as predicted by each of the following four combinations: $M + 1 SD$ for positive affect with $M + 1 SD$ for negative skills; $M + 1 SD$ for positive affect with $M - 1 SD$ for negative skills; $M - 1 SD$ for positive affect with $M + 1 SD$ for negative skills; and $M - 1 SD$ for positive affect with $M - 1 SD$ for negative skills.

All four panels in Figure 1 take the same basic form: When a spouse displays relatively low levels of negative skills, rates of change in satisfaction are the same, regardless of whether the spouse is also expressing relatively low versus high levels of positive affect. However, when a spouse displays relatively high levels of negative skills, low levels of positive affect hasten rates of decline in marital satisfaction. The apparently detrimental effects of negative skills are offset when they are displayed in discussions marked by high levels of positive affect.

Because slopes are quantified as MAT points per month, any of the four mean slope values in the four panels can be multiplied by 48 (12 months \times 4 years) to estimate the magnitude of declines in satisfaction over the course of the study. Applied to Figures 1A through 1D, respectively, this indicates that spouses high in negative skills and low in positive affect decline 22.1, 24.5, 19.2, and 25.0 MAT points over 4 years ($M = 22.7$). Considering that the mean MAT scores for husbands and wives were approximately 127 and 130 (see Table 1), these changes reflect a fairly sharp decline in satisfaction that brings spouses close to the conventional cutoff of 100 for marital distress. Spouses who display the other three combinations of behaviors, by contrast, are relatively similar to each other and decline an average of 12.0, 11.5, 9.6, and 11.5 MAT points over the same interval ($M = 11.2$).

A second significant interaction in Table 5 involves the combination of husbands' positive affect and positive skills, observed in discussion of husband topics, predicting declines in wives' satisfaction. A graphic representation of this interaction (not shown) indicates that the rate of decline in wives' satisfaction is greatest when husbands display low levels of positive affect and low levels

of positive skills in discussion of topics they have raised. Wives in this condition decline 24.5 MAT points over 4 years, in contrast to those in the other three conditions, who experience a mean 4-year decline of 11 MAT points. As in the preceding interactions, high levels of positive affect appear to negate any adverse effects of skill deficiencies; deficits in positive skills appear to be consequential only in the context of low levels of humor and affection.

The remaining two significant interactions involved negative affect and positive skills displayed in discussion of wives' topics, by husbands and by wives. As the corresponding effect sizes suggest, however, these two interactions took different forms depending on whether wives' slopes (.15) or husbands' slopes (-.18) were the dependent variable. Wives' declines were greatest when interactions marked by high levels of negative affect also involved low levels of positive skills (see Figure 2A). These wives declined an average of 22 MAT points over the course of the study, whereas those exposed to high levels of anger and contempt and high levels of positive skills declined an average of 9 MAT points. When husbands' levels of anger and contempt were low, wives declined about 14 MAT points, regardless of the relative presence or absence of positive skills. Thus, although the preceding interactions indicated that declines associated with skill codes could be offset by (positive) affect codes, this interaction indicates that the effects of husbands' negative affect can be mitigated by their positive skills.

Turning to the interaction of these same two codes in the prediction of husbands' slopes, it can be seen from Figure 2B that husbands' satisfaction is most likely to decline when wives' high levels of negative affect are coupled with high levels of positive skills during discussion of wives' topics (mean decline = 20.2 MAT points). When wives' high levels of negative affect occur in

discussions with low levels of positive skills, husbands decline only 5.3 MAT points (the remaining two groups of husbands, exposed to low levels of wives' negative affect, decline 8.6 MAT points when wives also display relatively high levels of positive skills and 11.5 MAT points when wives display relatively low levels of positive skills). This is an unexpected pattern of results, yet it may suggest that an unusual combination of behaviors on the part of wives—high levels of anger and contempt expressed in the same interaction with high levels of agreement, compromise, and constructive solutions when discussing topics of concern to them—(a) presents husbands with complex competing messages and (b) may indicate an effort on the part of wives to mask strong negative feelings with positive verbal content.

Aggregate effect sizes. We next conducted analyses with slopes in an effort to identify patterning in prediction as a function of husband versus wife behavior, husband versus wife discussion topics, and husband versus wife slopes. First, the magnitude of predictive effects attained with husbands' behavior ($M = .09$, $SD = .06$) was weaker than that attained with wives' behavior ($M = .12$, $SD = .06$), $t(47) = -2.2$, $p < .05$. Second, the magnitude of prediction achieved with behaviors coded in the husband-selected topics ($M = .12$, $SD = .06$) was stronger than that achieved with behaviors coded in the wife-selected topics ($M = .09$, $SD = .05$), $t(47) = 2.2$, $p < .05$. Third, prediction of wives' slopes ($M = .11$, $SD = .07$) tended to be stronger in magnitude than prediction of husbands' slopes ($M = .10$, $SD = .05$), $t(47) = 2.1$, $p < .05$. (Though quite similar in magnitude, these effects differed because the standard error of the mean on these variables was .004.)

All of the effect sizes were examined to determine whether slopes were predicted more strongly from skill codes, affect codes,

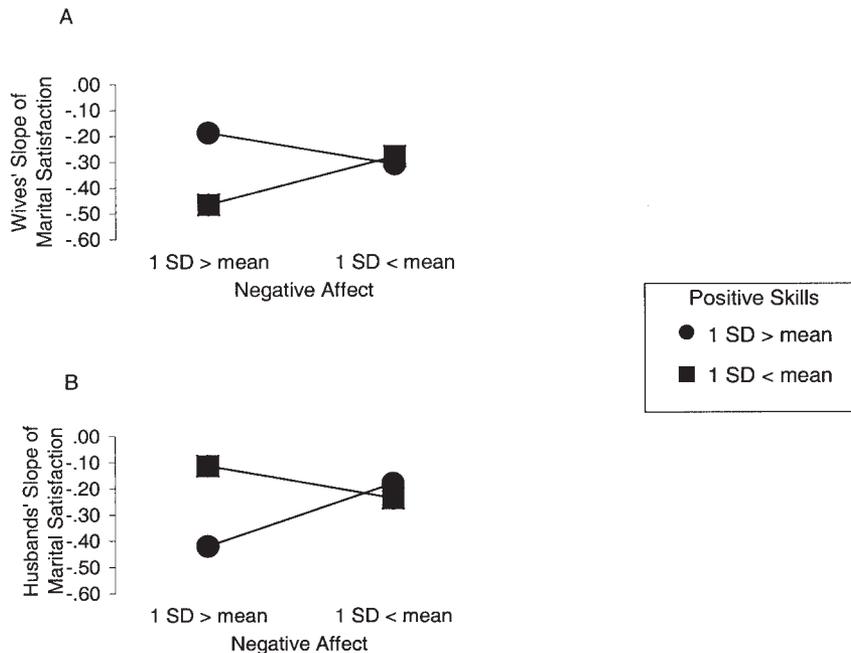


Figure 2. Interactions between negative affects and positive skills: (A) husbands' behaviors during discussion of wives' topics, predicting changes in wives' marital satisfaction and (B) wives' behaviors during discussion of wives' topics, predicting changes in husbands' marital satisfaction.

or their interactions. When using husbands' behaviors, prediction from skill codes ($M = .11$, $SD = .05$) and affect codes ($M = .11$, $SD = .05$) were comparable and were stronger than their interactions ($M = .06$, $SD = .05$), $F(2, 30) = 16.4$, $p < .01$, $\eta^2 = .52$. When using wives' behavior, there were no differences in the magnitudes of prediction attained from skill codes ($M = .13$, $SD = .06$), affect codes ($M = .11$, $SD = .06$), or their interaction ($M = .11$, $SD = .06$), $F(2, 30) = 1.2$, ns , $\eta^2 = .08$.

Discussion

Building on the seminal distinction between the verbal content of communicative acts and the affective tone with which they are delivered (e.g., Gottman, 1979) and on recent longitudinal studies of newlywed couples (e.g., Huston & Chorost, 1994; Kiecolt-Glaser et al., 2003), the present study was designed to aid in specifying observable precursors of marital change by coding specific affects and problem-solving skills from discussions of marital difficulties identified separately by husbands and wives using a relatively large sample of couples. Positive and negative skill and affect codes and all Affect \times Skill interactions were examined in relation to trajectories of marital satisfaction approximated from eight waves of data collected over the early, high-risk period for marital deterioration, while controlling for the severity of the problems that couples discussed. Before summarizing the findings and outlining their implications for research, theory, and intervention, we first discuss limitations of the study.

Interpretation of the present findings must be tempered by several factors. First, change in marital satisfaction, and not marital dissolution, was the focus of this study. Antecedents of dissatisfaction and dissolution are likely to differ (e.g., Rogge & Bradbury, 1999), and it cannot be assumed that the behavioral findings reported here extend to couples who end their marriage. Second, although a range of affects and skills was coded in the present study, reducing them to positive and negative composites may mask the effects of particularly potent behaviors. Third, sequential dependencies between husbands' and wives' behaviors were not examined. Although there is evidence from a recent 10-year study that sequential dependencies between skill codes are unrelated to changes in marital satisfaction (Kiecolt-Glaser et al., 2003), the possibility remains that sequential variables enhance prediction of marital outcomes. Likewise, an examination of the skill-affect interactions across spouses was beyond the scope of this article but may also be predictive of changes in marital satisfaction. Fourth, the behavioral data in this study come from controlled laboratory sessions. The present findings lend support to the validity of laboratory-based studies of marital interaction, yet this procedure may undersample common behaviors—such as avoidance and disengagement—that also foreshadow relationship deterioration. Fifth, although study procedures were relatively successful at recruiting a sample diverse in ethnicity and cultural background, they were less successful at recruiting couples with lower levels of formal education and socioeconomic standing. Sixth, the divorce rate in this sample was relatively low, probably because recruitment through public records yields marriages that are healthy relative to those recruited via advertisements (Karney et al., 1995). Seventh, as noted previously, the curvilinearity of the trajectories was not estimated, preventing the magnitude of the associations between dyadic behavior and variance in the curvature of the

trajectories from being estimated. Finally, this is a correlational study and is subject to all inferential shortcomings associated with nonexperimental designs.

Several key findings emerge from this analysis. First, whereas the larger literature on marital interaction has tended to assume that negative skills and, particularly, negative affect are precursors to marital dysfunction, the present analyses demonstrate that both affect codes and both skill codes serve as reliable predictors of levels and rates of change in marital satisfaction. All of these associations were in the anticipated directions, and there was no marked superiority of negative affect and negative skill codes over their positive counterparts. These findings corroborate the small number of longitudinal studies on interaction in newlywed marriage, specifically regarding the contributions of negative skills (Kiecolt-Glaser et al., 2003), negative affect (Huston & Vangelisti, 1991; Rogge & Bradbury, 1999), and positive affect (Gottman et al., 1998; Rogge & Bradbury, 1999) to change in satisfaction. Unlike the study by Kiecolt-Glaser and colleagues (2003), reliable associations were obtained here with positive skills, perhaps owing to the shorter follow-up interval in the present study. These findings help support the premise that marital outcomes are indeed governed in part by variability in rewarding exchanges between partners. Together with analyses of socially supportive behaviors in marriage (e.g., Cutrona, 1996), they indicate that positive and negative elements of marital communication should be accorded equal status in future analyses of marital change.

The importance of positive skills and positive affect takes on greater significance when considering a second key finding regarding the value of statistical interactions for predicting marital satisfaction slopes. All seven reliable interactions included positive affect or positive skills, and the most robust of these indicated that the apparently detrimental effects of high levels of negative skills were mitigated by expressions of humor, affection, and interest/enthusiasm, to the point where these couples were indistinguishable in their slopes from those displaying low levels of negative skills. This effect, which has close parallels to the interaction of negativity and affectionate behavior reported by Huston and Chorost (1994), emerged in various configurations involving husbands' and wives' behaviors, husbands' and wives' topics, and husbands' and wives' slopes (see Figures 1A–1D). Somewhat similarly, the interaction between positive affects and positive skills indicated that high levels of positive affect again had a mitigating effect. Wives of husbands displaying relatively high levels of positive affects and low levels of positive skills during discussion of the husbands' topics were indistinguishable in their slopes from wives exposed to high levels of husbands' positive skills (see Figure 2). In short, expressions of affection, humor, and interest or enthusiasm have the power to eliminate the otherwise detrimental effects observed when high levels of negative skills and low levels of positive skills are delivered with little positive affect. This implies that additive models of interaction codes misrepresent how exchanged behaviors give rise to marital deterioration and that more accurate models need to address how the various channels of marital communication combine to affect change in judgments of relationship satisfaction.

A third key finding is that statistical interactions emerged as predictors of rates of change in satisfaction but not as predictors of levels of marital satisfaction. This means that multiplicative combinations of affect and skill codes contribute to an understanding

of the degree to which judgments of satisfaction change over time, after spouses are equated on level, but that variability in levels, above and beyond the slopes, can be understood with reference to the simpler main effects of skill and affect codes. This finding is important because it underscores the importance of disambiguating levels and slopes in HLM and because it suggests that prediction of the more complex variable (i.e., slopes) requires codes that contain more contextual information about the exchanged behaviors. To understand, for example, the role of negative skills in altering the degree to which a spouse feels satisfied in marriage over time, it is also important to know whether those skills were embedded in an interaction marked by relatively low versus high levels of positive affect; for the simpler variable, which merely reflects the overall level of satisfaction over a 4-year period, the more complex codes provide no new information. It is an open question whether identical slopes have different consequences (e.g., for dissolution) as a function of whether they occur at low versus high levels; research is needed to address this point.

Perhaps the most important implication of this study is that whereas information is accruing on interpersonal profiles of newlywed marriages likely to encounter significant declines in satisfaction, less is known about the chain of events leading from particular interaction characteristics to changes in evaluative judgments about the marriage. How is it, for example, that when husbands' topics of marital tension are discussed with fewer positive skills and more negative skills (displayed by husbands; see Table 5) and with less positive affect and more negative affect and negative skills (displayed by wives) that husbands experience a relatively rapid rate of decline in marital satisfaction? Are these couples discouraged from discussing the husband's relationship concerns, which then fuels his further dissatisfaction? Might such an effect be confined to relationship concerns or does it extend to interactions with the partner more generally, so that partners gradually "grow apart" in their marriage? Does the toll extracted by relatively high rates of negative affect and negative skills drive out the positive exchanges that initially brought the partners together, so that the interpersonal repertoires of couples become constricted and tense? These are not mutually exclusive possibilities, of course, and we can expect that a range of mechanisms might operate to link interactional processes with marital outcomes. Nevertheless, if, as social learning theory implies, the interactional context is the crucible in which spouses learn whether they are in a relatively fulfilling versus unfulfilling relationship, then it becomes increasingly important to chart the evolution of behavioral propensities for couples varying in satisfaction trajectories.

The present findings lend support to intervention approaches that emphasize modification of interaction patterns as a strategy for strengthening marriages, and they underscore the value of focusing on problem solving and potential conflicts as domains in which to target behavioral change. The identification of positive skills, positive affects, and their interactions as possible contributors to changes in satisfaction draws attention to the likely value of those interventions that facilitate recognition and use of prosocial processes, in conjunction with the containment of negative skills and the management of strong negative affects, such as anger and contempt (e.g., Rogge, Cobb, Johnson, Lawrence, & Bradbury, 2002). In particular, couples are likely to grasp readily (a) the importance of keeping good will and positive feelings salient in their relationship, (b) the oft-repeated distinction between "what

you say" (i.e., skills) and "how you say it" (affect), and (c) the notion that a critical comment can have markedly different effects depending on whether or not the discussion also contains humor and sincere affection. It bears noting, however, that the present findings were collected specifically in the context of problem solving, and, as such, it is the use of specific skills and affects in this domain—rather than engaging in, for example, fun and enjoyable activities—that is implicated as being consequential in this analysis.

Although the present findings bear on the task of strengthening developing marriages, it is important to not equate the predictive effects reported here with prescriptions for preventing marital distress and dissolution. For example, direct application of the present findings is constrained by the possibility that the behaviors shown to predict changes in marriage may themselves be a consequence of global perceptions about relationship interaction. If couples approach discussions with their partner as a pleasant time to catch up, work on the relationship together, and plan for the future, then their interactions will proceed differently than if the discussions are viewed as a time when they need to defend themselves from the partner's unreasonable demands, influence the partner, or avoid uncomfortable sources of tension in the relationship. Moreover, though it is tempting to assume that a slight shift in the degree of positive affect displayed by couples could transform negative skills from having a detrimental influence to having a benign influence on marital change, this overlooks the possibility that long-standing factors set the levels at which these behaviors are displayed in marriage. Evidence is accumulating to indicate that observed behaviors early in marriage mediate the intergenerational transmission of relationship dysfunction (Sanders, Halford, & Behrens, 1999), suggesting that behaviors with deeper roots in the family of origin may be more difficult to change than those representing simple skill deficits or daily stresses at work or school.

References

- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.
- Bradbury, T. N., Cohan, C. L., & Karney, B. R. (1998). Optimizing longitudinal research for understanding and preventing marital dysfunction. In T. N. Bradbury (Ed.), *The developmental course of marital dysfunction* (pp. 279–311). New York: Cambridge University Press.
- Bryk, A. S., & Raudenbush, S. W. (1992). *Hierarchical linear models: Application and data analysis methods*. Newbury Park, CA: Sage.
- Cutrona, C. E. (1996). *Social support in couples: Marriage as a resource in times of stress*. Thousand Oaks, CA: Sage.
- Dunn, O. J., & Clark, V. A. (1971). Comparison of tests of the equality of dependent correlation coefficients. *Journal of the American Statistical Association*, *66*, 904–908.
- Fincham, F. D., & Beach, S. R. H. (1999). Conflict in marriage: Implications for working with couples. *Annual Review of Psychology*, *50*, 47–77.
- Geiss, S. K., & O'Leary, K. D. (1981). Therapist's ratings of frequency and severity of marital problems: Implications for research. *Journal of Marital and Family Therapy*, *7*, 515–520.
- Gottman, J. M. (1979). *Marital interactions: Experimental investigations*. New York: Academic Press.
- Gottman, J. M., Coan, J., Carrère, 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.
- Hahlweg, K., Reisner, L., Kohli, G., Vollmer, M., Schindler, L., & Revenstorff, D. (1984). Development and validity of a new system to analyze interpersonal communication: Kategoriensystem für Partnerschaftliche Interaktion. In K. Hahlweg & N. S. Jacobson (Eds.), *Marital interaction: Analysis and modification* (pp. 182–198). New York: Guilford.
- 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*, 16–27.
- Heyman, R. E. (2001). Observation of couple conflicts: Clinical assessment applications, stubborn truths, and shaky foundations. *Psychological Assessment, 13*, 5–35.
- Hills, J. M., & Johnson, M. D. (2000, April). *Examining the construct validity of a behavioral coding system for marital interactions*. Poster presented at the annual conference of the Eastern Psychological Association, Washington, DC.
- Huston, T. L., & Chorost, A. F. (1994). Behavioral buffers on the effect of negativity on marital satisfaction: A longitudinal view. *Personal Relationships, 1*, 223–239.
- Huston, T. L., & Vangelisti, A. L. (1991). Socioemotional behavior and satisfaction in marital relationships: A longitudinal study. *Journal of Personality and Social Psychology, 61*, 721–733.
- Jacobson, N. S., & Margolin, G. (1979). *Marital therapy: Strategies based on social learning and behavior exchange principles*. New York: Brunner/Mazel.
- Johnson, M. D. (2002). The observation of specific affect in marital interactions: Psychometric properties of a coding system and a rating system. *Psychological Assessment, 14*, 423–438.
- Karney, B. R., & Bradbury, T. N. (1995a). Assessing longitudinal change in marriage: An introduction to the analysis of growth curves. *Journal of Marriage and the Family, 57*, 1091–1108.
- Karney, B. R., & Bradbury, T. N. (1995b). The longitudinal course of marital quality and stability: A review of theory, method, 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.
- Karney, B. R., Davila, J., Cohan, C. L., Sullivan, K. T., Johnson, M. D., & Bradbury, T. N. (1995). An empirical investigation of sampling strategies in marital research. *Journal of Marriage and the Family, 57*, 909–920.
- 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*, 176–188.
- Kurdek, L. A. (1991). Predictors of increases in marital distress in newlywed couples: A 3-year prospective longitudinal study. *Developmental Psychology, 27*, 627–636.
- Locke, H. J., & Wallace, K. M. (1959). Short marital-adjustment and prediction tests: Their reliability and validity. *Journal of Marriage and Family Living, 21*, 251–255.
- Margolin, G., & Wampold, B. E. (1981). Sequential analysis of conflict and accord in distressed and nondistressed marital partners. *Journal of Consulting and Clinical Psychology, 47*, 554–567.
- Markman, H. J., Floyd, F. J., Stanley, S. M., & Storaasli, R. D. (1988). Prevention of marital distress: A longitudinal investigation. *Journal of Consulting and Clinical Psychology, 56*, 210–217.
- Raudenbush, S. W., Brennan, R. T., & Barnett, R. C. (1995). A multivariate hierarchical model for studying psychological change within married couples. *Journal of Family Psychology, 9*, 161–174.
- Raudenbush, S. W., Bryk, A. S., Cheong, Y. F., & Congdon, R. T. (2000). *HLM 5: Hierarchical linear and nonlinear modeling*. Lincolnwood, IL: Scientific Software International.
- Rogge, R. D., & Bradbury, T. N. (1999). Till violence do us part: The differing roles of communication and aggression in predicting adverse marital outcomes. *Journal of Consulting and Clinical Psychology, 67*, 340–351.
- Rogge, R. D., Cobb, R. M., Johnson, M. D., Lawrence, E., & Bradbury, T. N. (2002). The CARE Program: A preventative approach to marital intervention. In A. S. Gurman & N. S. Jacobson (Eds.), *Clinical handbook of couple therapy* (3rd ed., pp. 420–435). New York: Guilford.
- Sanders, M. R., Halford, W. K., & Behrens, B. C. (1999). Parental divorce and premarital couple communication. *Journal of Family Psychology, 13*, 60–74.
- Smith, D. A., Vivian, D., & O'Leary, K. D. (1990). Longitudinal prediction of marital discord from premarital expressions of affect. *Journal of Consulting and Clinical Psychology, 58*, 790–798.
- Thibaut, J. W., & Kelley, H. H. (1959). *The social psychology of groups*. New York: Wiley.
- Wills, T. A., Weiss, R. L., & Patterson, G. R. (1974). A behavioral analysis of the discriminants of marital satisfaction. *Journal of Consulting and Clinical Psychology, 42*, 802–811.

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