Journal of Personality and Social Psychology
August 1992 Vol. 63, No. 2, 221-233

Marital Processes Predictive of Later Dissolution Behavior, Physiology, and Health

John M. Gottman
Department of Psychology University of Washington
Robert W. Levenson
Department of Psychology University of California, Berkeley

ABSTRACT

Seventy-three married couples were studied in 1983 and 1987. To identify marital processes associated with dissolution, a balance theory of marriage was used to generate 1 variable for dividing couples into *regulated* and *nonregulated* groups. For studying the precursors of divorce, a "cascade" model of marital dissolution, which forms a Guttman-like scale, received preliminary support. Compared with regulated couples, nonregulated couples had (a) marital problems rated as more severe (Time 1); (b) lower marital satisfaction (Time 1 and Time 2); (c) poorer health (Time 2); (d) smaller finger pulse amplitudes (wives); (e) more negative ratings for interactions; (f) more negative emotional expression; (g) less positive emotional expression; (h) more stubbornness and withdrawal from interaction; (i) greater defensiveness; and (j) greater risk for marital dissolution (lower marital satisfaction and higher incidence of consideration of dissolution and of actual separation).

We wish to acknowledge National Institute of Mental Health (NIMH) Grant ROI PHS MH42722 and Research Scientist Development Award, and Research Scientist Award 1K02MH00257 to John M. Gottman and NIMH Grant MH39895and National Institute on Aging Grant AG07476 to Robert W. Levenson.
Correspondence may be addressed to John M. Gottman, Department of Psychology, University of Washington, Guthrie Hall, NI-25, Seattle, Washington, 98195.
Received: October 15, 1990
Revised: March 23, 1992
Accepted: April 3, 1992

There are currently over one million divorces a year in the United States, with estimates that almost 50% of marriages will ultimately end in divorce (Cherlin, 1981). Marital dissolution is a serious social issue in terms of its negative consequences for the mental and physical health of spouses (Levinger & Moles, 1979) and their children (Emery, 1988).

Previous Studies

Despite the importance of marital dissolution, empirical research has not been very successful at predicting which married couples will separate or divorce and which married couples will stay together. Attempts at prediction have usually been epidemiological, designating cohorts and demographic groups that are thought to be at the greatest risk for marital dissolution (Bennett, Blanc, & Bloom, 1988 ; Cherlin, 1981). Lamentably, studies attempting to identify marital processes that are antecedents of marital dissolution have been quite rare (for a review, see Newcomb & Bentler, 1981).

Our current lack of knowledge concerning which patterns of marital interaction lead to marital dissolution stems partly from the fact that, in most studies, divorce and separation have been viewed as independent rather than dependent variables (e.g., Hetherington, Cox, & Cox, 1978 , 1982). Thus, these studies have been primarily concerned with the *effects* of marital dissolution on other variables and on the adjustment of spouses and children to marital dissolution.

Of the nearly 1,200 published studies to date with the terms *marital separation* or *divorce* in their titles, we know of only four prospective longitudinal studies that have attempted to predict future separation and divorce (Bentler & Newcomb, 1978 ; Block, Block, & Morrison, 1981 ; Constantine & Bahr, 1980 ; Kelly & Conley, 1987). [1] In the Block et al. study of 57 families with children who were 3.5 years old, parental disagreement about child-rearing practices discriminated between the intact and divorced groups 10 years later. Constantine and Bahr, in a 6-year longitudinal study, found that the group of men who either divorced or separated had a greater "internal orientation" on the leadership subscale of a measure of locus of control than did men who remained married. Bentler and Newcomb (1978) found that couples who remained married were more similar in age, interest in art, and attractiveness than couples who separated or divorced. Men who separated or divorced described themselves as more extraverted, more invulnerable, and more orderly than men who stayed married. Women who separated or divorced described themselves as less clothes conscious and less congenial than women who stayed married. Kelly and Conley (1987) , using acquaintance ratings of personality in a prospective 35-year longitudinal study of marital stability, reported that the men who remained married were more conventional and less neurotic, and had greater impulse control than those who divorced. A similar pattern was found for women, with the additional finding that women who stayed married were judged as higher in emotional closeness and lower in tension in their families of origin.

Aggregating findings from these four studies does not provide a coherent theoretical picture of couples or individuals at risk for marital dissolution. Furthermore, effect sizes in these studies were not particularly large. Nonetheless, that relations did obtain is encouraging for additional efforts at longitudinal prediction using the same and other methods. From our perspective, an important methodological improvement would be the addition of direct observation of marital behavior, which could provide greater descriptive clarity in prospective longitudinal research and might account for greater amounts of variance in marital dissolution.

The Problem of Low Base Rates of Divorce in Short-Term Longitudinal Studies

Ironically, although many marriages will ultimately end in divorce, attempts to predict marital dissolution over short, 3- to 5-year periods are often plagued by low base rates of divorce. In part, this problem simply reflects that it can take many years for an unsatisfying marriage to formally dissolve, but it also may reflect sampling issues (e.g., couples who are willing to participate in these kinds of research projects may be those who are least likely to divorce). Examples of low base rates for divorce in short-term longitudinal studies are common. In Kelly and Conley's (1987) study of 278 couples who were married in 1935, the divorce rate was approximately 0.5% per year. There is evidence that the divorce rate is somewhat higher among more contemporary cohorts. For example, in the more recent Block et al. study, the divorce rate was 2.8% per year (16 of 57 couples in 10 years). However, even with somewhat higher divorce rates, the problem of low base rates of divorce can be a major deterrent to conducting short-term longitudinal studies of marital dissolution.

A "Cascade Model" of Marital Dissolution

In this article, we propose a partial solution to this low—base-rate problem by borrowing and modifying methodological concepts from "high-risk" research. Thus, we identify variables with relatively high base rates of occurrence that are likely precursors of the relatively low—base-rate variable of primary interest, namely, divorce. Conceptually, these precursor variables could be arranged in the form of a Guttman scale, suggesting a cascade or stage model, in which couples who are destined ultimately to reach the final stage (i.e., divorce) are likely to pass through the earlier stages on the way. Using such a model, a short-term longitudinal study of divorce could attempt to predict the hypothesized precursor variables, assuming that couples in these earlier stages will be most likely ultimately to divorce (see also Weiss & Cerreto, 1980).

For present purposes, we hypothesized a simple, cascade model: low marital satisfaction at Time 1 and at Time 2 (separated by 4 years in our study) -> consideration of separation or consideration of divorce -> separation -> divorce. Whereas we consider this model likely to reflect the model course of marital dissolution, we will not be able to provide a definitive test until later in the course of our ongoing longitudinal studies, given that many of our variables are measured at Time 2. In the meantime, we conducted a preliminary test of the model's viability by applying structural equations modeling to those data that are currently available.

In considering this cascade model, a likely first reaction is that it is not very profound. Isn't it obvious that couples who divorce are likely to have previously separated, and, before that, to have considered dissolution, and before that to have been unhappily married? In reality, this kind of progression has never been demonstrated empirically, and furthermore, it may be only one of a number of possible progressions. For example, marital dissatisfaction may be a process independent of marital dissolution (Lederer & Jackson, 1968). Everyone knows of very unhappily married couples who continue to stay together for a variety of reasons (e.g., religiosity; see Bugaighis, Schumm, Jurich, & Bollman, 1985). We currently are studying a group of such unhappy couples, many of whom have been together for over 35 years.

Goals of This Research

We set four goals for this work. First, we sought to identify a parsimonious and theoretically interesting set of marital processes that would enable us to predict and to understand marital dissolution. Second, we wished to more fully describe these processes using direct observation of marital behavior. Third, we sought to demonstrate the validity of our cascade model of marital dissolution. Fourth, we sought to demonstrate that a dichotomous classification of couples, based on coding of marital behavior, is an effective means of predicting which marriages are at risk longitudinally for dissolution. Because our data is correlational, we were not able to isolate a type of marital interaction that causes marital dissolution, but rather hoped to identify a behaviorally based "marker" that identifies couples who are likely to be on a path toward dissolution.

Overview

In this study, we used a method for obtaining synchronized physiological, behavioral, and self-report data that we used previously in a sample of 30 couples followed longitudinally between 1980 and 1983 (Levenson & Gottman, 1983 , 1985). For the present study we used a new group of 73 couples who were followed longitudinally between 1983 and 1987. Using observational coding of affective behavior, couples were divided into two groups. We expected that couples in the two groups would differ in terms of behavior, emotion, physiology, and marital satisfaction. We also expected that couples in one group would be more likely than those in the other group to be on the hypothesized course toward marital dissolution at Time 1 and to be more likely to move toward separation and divorce in the intervening 4-

year period.

Method

Subjects

We recruited couples in 1983 in Bloomington, Indiana, by using newspaper advertisements. Approximately 200 couples who responded to these advertisements were administered a demographic questionnaire and two measures of marital satisfaction (Burgess, Locke, & Thomes, 1971 ; Locke & Wallace, 1959 [2]), for which they were paid $5. From this sample, a smaller group of 85 couples was invited to participate in the laboratory assessments and to complete a number of additional questionnaires (including measures of health). The goal of this two-stage sampling was to obtain a distribution of marital satisfaction in which all parts of the distribution would be equally represented. Because of equipment problems, physiological data from 6 couples were incomplete, leaving a sample of 79 couples, who in 1983 had the following mean characteristics: (a) husband age = 31.8 (*SD* = 9.5), (b) wife age = 29.0 (*SD* = 6.8), (c) years married = 5.2 (*SD* = 6.3), (d) husband marital satisfaction (average of two marital satisfaction scales) = 96.80 (*SD* = 22.16), and (e) wife marital satisfaction = 98.56 (*SD* = 20.70).

This sample of 79 couples is an entirely different sample from the sample of 30 couples studied in our previous work (Levenson & Gottman, 1983 , 1985 ; Gottman & Levenson, 1985).

Procedure Interaction session.

The procedures used in this experiment were modeled after those described in Levenson and Gottman (1983) . Couples came to the laboratory after having not spoken for at least 8 hr. After recording devices for obtaining physiological measures were attached, couples engaged in three conversational interactions: (a) discussing the *events of the day,* (b) discussing a *problem area* of continuing disagreement in their marriage, and (c) discussing a mutually agreed on *pleasant topic*. Each conversation lasted 15 min, preceded by a 5-min silent period. During the silent periods and discussions, a broad sample of physiological measures was obtained and a video recording was made of the interaction.

Before initiating the problem area discussion, couples completed the Couple's Problem Inventory (Gottman, Markman, & Notarius, 1977), in which they rated the perceived severity (on a 0—100 scale) of a standard set of marital issues such as money, in-laws, and sex. The experimenter, a graduate student in counseling psychology, then helped the couple select an issue, which both spouses rated as being of high severity, to use as the topic for the problem-area discussion. The Couple's Problem Inventory also provided an index of each spouse's ratings of the *severity of problems* in the relationship (husbands' $\alpha = .79$; wives' $\alpha = .75$).

For purposes of the present study, only data from the problem area discussion were used. This decision was based on our previous research, in which data from the problem area discussion were the best longitudinal predictors of change in marital satisfaction (Levenson & Gottman, 1985), and on our plan to use marital interaction coding systems that primarily code problem-solving behavior.

Recall session.

Several days later, spouses separately returned to the laboratory to view the video recording of their interaction while the same physiological measures were obtained and synchronized with those obtained in the interaction session. Spouses used a rating dial to provide a continuous self-report of affect. The dial traversed a 180° path, with the dial pointer moving over a 9-point scale anchored by the legends *extremely negative* and *extremely positive,* with *neutral* in the middle. Subjects were instructed to adjust the dial continuously so that it always represented how they were feeling when they were in the interaction. Data supporting the validity of this procedure for obtaining continuous self-reported affect ratings have been presented in Gottman and Levenson (1985) .

1987 follow-up.

In 1987, four years after the initial assessment, the original subjects were recontacted and at least 1 spouse (70 husbands, 72 wives) from 73 of the original 79 couples (92.4%) agreed to participate in the follow-up. These 73 participants represented 69 couples in which both spouses participated, 1 couple in which only the husband participated, and 3 couples in which only the wife participated. Data from the nonparticipating partner in these 4 couples were treated as missing data.

For the follow-up, spouses completed the two marital satisfaction questionnaires, a measure of physical illness (the Cornell Medical Index [3]), and several items relevant to other stages of the hypothesized cascade model (i.e., during the 4-year period had the spouses considered separation or divorce, had they actually separated or divorced, and the length of any separation).

Apparatus Physiological.

We obtained five physiological measures by using a system consisting of two Lafayette Instruments six-channel polygraphs and a Digital Equipment Corporation LSI 11/73 microcomputer: (a) cardiac interbeat interval (IBI)–Beckman miniature electrodes with Redux paste were placed in a bipolar configuration on opposite sides of the subject's chest and the interval between R-waves of the electrocardiogram (EKG) was measured in ms; shorter IBIs indicate faster heart rate, which is typically interpreted as indicating a state of higher cardiovascular arousal; (b) skin conductance level–a constant voltage device passed a small voltage between Beckman regular electrodes attached to the palmar surface of the middle phalanges of the first and third fingers of the nondominant hand, passing through an electrolyte of sodium chloride in Unibase; increasing skin conductance indicates greater autonomic (sympathetic) activation; (c) general somatic activity–an electromechanical transducer attached to a platform under the subject's chair generated an electrical signal proportional to the amount of body movement in any direction; (d) pulse transmission time to the finger–a UFI photoplethysmograph was attached to the second finger of the nondominant hand. The interval was measured between the R-wave of the EKG and the upstroke of the finger pulse; shorter pulse transmission times are indicative of greater autonomic (sympathetic) activation; and (f) finger pulse amplitude (FPA)–the trough-to-peak amplitude of the finger pulse was measured; FPA measures the amount of blood in the periphery; reduced FPA often indicates greater vasoconstriction, which is associated with greater autonomic (sympathetic) activation. This set of physiological measures was selected to sample broadly from major organ systems (cardiac, vascular, electrodermal, and somatic muscle), to allow for continuous measurement, to be as unobtrusive as possible, and to include measures used in our previous studies (Levenson & Gottman, 1983).

The computer was programmed to process the physiological data on-line and to compute second-by-second averages for each physiological measure for each spouse. Later, averages were determined for each measure for the entire 15-min interaction period and for the 5-min preinteraction period.

Nonphysiological.

Two remotely controlled high-resolution video cameras that were partially concealed behind darkened glass were used to obtain frontal views of each spouse's face and upper torso. These images were combined into a single split-screen image using a video special effects generator and were recorded on a VHS video recorder. Two lavaliere microphones were used to record the spouses' conversations. The Digital Equipment Corporation computer enabled synchronization between video and physiological data by controlling the operation of a device that imposed the elapsed time on the video recording.

Observational Coding

The videotapes of the problem area interaction were coded using three observational coding systems. The Rapid Couples Interaction Scoring System (RCISS; Krokoff, Gottman, & Hass, 1989) provided the means for classifying couples into the *regulated* and *nonregulated* marital types (see below), as well as providing base rates of positive and negative speaker codes. The Marital Interaction Coding System (MICS; Weiss & Summers, 1983) and the Specific Affect Coding System (SPAFF; Gottman & Krokoff, 1989) were used as measures of convergent validity.

RCISS.

The RCISS uses a checklist of 13 behaviors that are scored for the speaker and 9 behaviors that are scored for the listener on each turn at speech. A turn at speech is defined as all utterances by one speaker until that speaker yields the floor to vocalizations by the other spouse (vocalizations that are merely back-channels such as *mm-hmm* are not considered as demarcating a turn). In the present study, only codes assigned to speakers were used to classify couples. These codes consisted of five positive codes (*neutral or positive problem description, task-oriented relationship information, assent, humor—laugh,* and *other positive*) and eight negative codes (*complain, criticize, negative relationship issue problem talk, yes-but, defensive, put down, escalate negative affect,* and *other negative*). We computed the average number of positive and negative speaker codes per turn of speech and the average of positive minus negative speaker codes per turn. Tapes were coded by a team of coders who used verbatim transcripts. Using Cohen's k, reliability for all RCISS subcodes taken together was .72. For the individual speaker codes, Cohen's k ranged from .70 to .81.

Using RCISS point graphs to classify couples.

Based on RCISS speaker codes, couples were classified into two types: (a) regulated and (b) nonregulated. This classification was based on a point graph method originally proposed by Gottman (1979) for use with the Couples Interaction Scoring System, a predecessor of the RCISS. On each conversational turn the total number of positive RCISS speaker codes minus the total number of negative speaker codes was computed for each spouse. Then the cumulative total of these points was plotted for each spouse. The slopes of these plots, which were thought to provide a stable estimate of the difference between positive and negative codes over time, [4] were determined using linear regression analysis. All couples, even happily married ones, have some amount of negative interaction; similarly, all couples, even unhappily married ones, have some degree of positive interaction.

The point graph slope summary description was guided by *a balance theory of marriage,* namely that those processes most important in predicting dissolution would involve a balance, or a regulation, of positive and negative interaction. Thus, the terms *regulated* and *nonregulated* have a very precise meaning here. Regulated couples were defined as those for whom both husband and wife speaker slopes were significantly positive; nonregulated couples had at least one of the speaker slopes that was not significantly positive. By definition, regulated couples were those who showed, more or less consistently, that they displayed more positive than negative RCISS codes. Classifying couples in the current sample in this manner produced two groups consisting of 42 regulated couples and 31 nonregulated couples.

Examples of the speaker point graphs for one regulated and one nonregulated couple are presented in Figure 1 .

MICS.

The MICS is the oldest and most widely used marital interaction coding system. It contains codes that tap many of the same aspects of marital interaction as does the RCISS, probably with less precision than the RCISS. MICS coding was carried out in a separate laboratory, with an entirely different group of coders, under the supervision of Dr. Robert Weiss at the University of Oregon (see Weiss & Summers, 1983 , for a discussion of the MICS codes and a review of literature that has used the MICS). For purposes of data reduction, following an aggregating scheme [5] validated in a longitudinal study by Gottman and Krokoff (1989) , we collapsed the 33 MICS codes into 4 negative summary codes: (a) *defensiveness:* sum of excuse, deny responsibility, negative solution, and negative mind reading by the partner; (b) *conflict engagement:* sum of disagreement and criticism; (c) *stubbornness:* sum of noncompliance, verbal contempt, command, and complaint; and (d) *withdrawal from interaction:* sum of the negative listener behaviors of no response, not tracking, turn off, and incoherent talk.

Codes were assigned continuously by coders for 30-s blocks. Double codes, which are used with more recent versions of MICS, were treated as additional single codes for this research. Means reported for the MICS are the total number of codes in 15 min. A sample of every videotape was independently coded by another observer, and a confusion matrix (i.e., matrix of counts of agreements and disagreements for two observers) for each code category was computed. The average weighted Cohen's k for this coding (all individual subcodes, summed over all couples) was .60. For the four negative summary codes, the overall Cohen's ks were higher, ranging between .65 and .75.

Specific affect coding system.

To provide information on specific affects, an independent team of coders used the SPAFF. The SPAFF is a cultural informant coding system in which coders consider an informational gestalt consisting of verbal content, voice tone, context, facial expression, gestures, and body movement. For present purposes, only the speaker's affect was coded. Coders classified each turn at speech as affectively neutral, as one of five negative affects (*anger, disgust/contempt, sadness, fear,* and *whining*), or as one of four positive affects *(affection, humor, interest,* and *joy*). The Cohen's k coefficient of reliability, controlling for chance agreements, was .75 for the entire SPAFF coding. Cohen's ks for individual codes ranged between .63 and .76.

Results

During the 4 years between 1983 and 1987, 36 of 73 couples (49.3%) reported considering dissolving their marriage. Eighteen of the 73 couples (24.7%) actually separated; their average length of separation was 8.1 months. Nine of the 73 couples actually divorced (12.5%). Thus, as suggested in the introduction to this report, the low annual base rate of divorce and the short 4-year period resulted in a fairly small pool of divorced couples.

Our analyses of these data will be reported first in terms of evaluation of the cascade model of marital dissolution and then in terms of the distinction between regulated and nonregulated couples. [6]

Support for the Hypothesized Cascade Model of Marital Dissolution

As indicated earlier, predicting marital dissolution would be much easier if events with higher base rates than actual divorce (i.e., marital dissatisfaction at each time point, considering dissolution, and separation) were known to be precursors of divorce, as in a classical Guttman scale. Using structural equations modeling, [7] we developed a way of evaluating such a scale. If a set of variables is to be tested for whether they form a Guttman-like scale, in the equations for what we will call a "fully saturated" Guttman scale, Variable 2 should be written as a linear function of Variable 1 and the error term; Variable 3 should be written as a linear function of Variables 1 and 2 and the error term; Variable 4 should be written as a linear combination of Variables 1, 2, and 3 and the error term; and so on. In the interest of parsimony, we selected a small set of variables for this model. Thus, we began with what is known as the saturated model and eliminated all nonsignificant paths until we arrived at the parsimonious model shown in Figure 2 .

Before we used structural equations modeling, simple statistical tests suggested the data were consistent with a Guttmanscale notion. Couples who had divorced were more likely to have separated than those who had not, $\chi^2_1 = 22.80, p < .001$. In addition, couples who had separated were more likely to have considered dissolution than those who had not, $\chi^2_1 = 15.59, p < .001$. Finally, couples who had considered dissolution were more likely to be lower in marital satisfaction in 1987, $t(55) = 7.27, p < .001$, and in 1983, $t(62) = 5.84, p < .001$, than those who had not. (Cell frequencies and means are presented in Table 3 .)

Figure 2 depicts the structural equations modeling applied to the cascade model, including path coefficients (with *z* scores in parentheses). This analysis revealed that the model in Figure 2 fits these data well, with a nonsignificant $\chi^2_4 = 7.09, p = .13$, and a normed Bentler—Bonett goodness of fit statistic of .994 (which is sufficiently close to 1.0 to indicate a good fit). This goodness of fit does not mean that the model represents a causal path, but rather that it is consistent with a Guttman-like ordering of the variables. An alternative model proposing that there is actually no cascade (i.e., we cannot predict the separation and divorce variables from the hypothesized precursor variables) was tested. In this alternative model, only common method variance was represented. This alternative model did not fit the data well, with a significant chi-square, $\chi^2_4 = 22.59, p < .001$. Table 1 presents the correlations between the variables of the cascade model.

Validity of the Regulated Versus Nonregulated Distinction

Using the RCISS point slope criteria, we found that there were 42 regulated and 31 nonregulated couples. One goal of this article was to evaluate the validity of this RCISS-based classification in terms of the two other observational coding systems (MICS and SPAFF). We also wished to compare the two types of couples in terms of marital dissolution, questionnaire and affect rating dial, and physiological variables.

Our general analytic strategy was first to conduct overall 2 × 2 Group (regulated or nonregulated) × Spouse (husband or wife) multivariate analyses of variance (MANOVAs) with spouse as a repeated measure for sets of variables (i.e., MICS summary codes, SPAFF codes, dissolution, questionnaire and affect rating dial, and physiological) and then follow these with similarly structured univariate analyses of variance (ANOVAS) for the individual variables. This MANOVA-ANOVA procedure was intended to provide some protection against Type I error, although its efficacy in this regard is controversial (Huberty & Morris, 1989).

MICS.

In the MANOVA of the four MICS codes, there was a significant group effect, F (4, 70) = 8.41, $p < .001$, a marginally significant spouse effect, F (4, 70) = 2.29, $p < .10$, and a nonsignificant Group × Spouse interaction, F (4, 70) = 1.57, *ns*. The ANOVAs revealed significant group effects for all four summary codes. Nonregulated couples showed higher rates of defensiveness (M = 2.76), conflict engagement (M = 5.79), stubborness (M = 1.87), and listener withdrawal from interaction (M = 8.72) than regulated couples (respective M s = 1.74, 3.54, 0.82, and 4.82). Spouse and Spouse × Group effects were either nonsignificant or marginally significant for all variables. Table 2 presents the results for the MICS codes.

SPAFF.

In the MANOVA of the 10 SPAFF codes, there was a significant group effect, F (10, 64) = 3.23, $p < .001$, a significant spouse effect, F (10, 64) = 4.76, $p < .001$, and a nonsignificant Group × Spouse interaction, F (10, 64) = 1.04, *ns*. The ANOVAs revealed significant group effects for 5 of the 10 codes. Nonregulated couples displayed less affection (M = 1.27), interest (M = 7.03), and joy (M = 0.36), and they showed more anger (M = 26.98) and whining (M = 4.56) than regulated couples (respective M s = 2.69, 12.44, 1.30, 12.15, and 2.50).

The ANOVAs also revealed several gender effects. Husbands were more neutral (M = 40.45), showed more affection (M = 2.41), were less angry (M = 17.05), and whined less (M = 1.94) than wives (respective M s = 32.64,1.72, 20.24, and 4.89). There were no significant Group × Spouse interactions. Table 2 presents the results for the SPAFF codes.

Summary of MICS and SPAFF results.

The regulated—nonregulated distinction was further specified by the MICS and the SPAFF. Regarding negative behaviors, nonregulated couples were more conflict engaging, more defensive, more stubborn, more angry, more whining, and more withdrawn as listeners than regulated couples. Regarding positive behaviors, nonregulated couples were less affectionate, less interested in their partners, and less joyful than regulated couples.

Marital dissolution variables.

There was a significant MANOVA group effect for the variables of the cascade model, F (5, 66) = 2.80, $p < .05$. If the variables of the cascade model form a Guttman scale, we would expect our typology to be better at discriminating precursor variables than the more rarely occurring criterion events. Table 3 shows that this was indeed the case. The univariate F ratios (and z scores for dichotomous variables) revealed decreasing differentiation as lower base rate events were approached. Table 3 further shows that nonregulated couples were at greater risk for the cascade toward marital dissolution than regulated couples on most measured variables. Seventy-one percent (22 of 31 couples) of nonregulated couples reported considering marital dissolution during the 4 years between 1983 and 1987, which was significantly greater than the 33% (14 of 42) of regulated couples, z = 3.18, p = .001. Thirty-six percent (11 of 31) of nonregulated couples actually separated, which was significantly greater than the 16.7% (7 of 42) of regulated couples, z = 1.84, p = .032. Nineteen percent (6 of 31) of nonregulated couples actually divorced, which approached being significantly greater than the 7.1% (3 of 42) of regulated couples, z = 1.57, p = .058. Table 3 also portrays the means for 1983 and 1987 marital satisfaction. Compared with regulated couples, nonregulated couples had lower levels of marital satisfaction at both times of measurement. [8]

Questionnaire and affect rating dial.

A MANOVA for the questionnaires and affect rating dial revealed there was a significant group effect, *F* (3, 68) = 6.43, *p* < .001, a nonsignificant spouse effect, *F* (3, 68) = 2.04, *ns,* and a nonsignificant Group × Spouse interaction, *F* (3, 68) = 1.71, *ns.* Subsequent analyses showed that this effect held for the severity of problem questionnaire, for the illness questionnaire, and for the affect rating dial. Univariate ANOVAs revealed that nonregulated couples indicated greater severity of problems *(M* = 21.58), reported more illness (24.28), and rated their interactions as more negative using the rating dial *(M* = 2.95) than regulated couples (respective *M* s = 15.85, 17.37, and 3.42). A significant univariate main effect for spouse for the illness variable revealed that wives reported more illness *(M* = 22.88) than husbands *(M* = 17.98) did. Results from these analyses are presented in Table 4 .

Physiological variables.

Multivariate analyses showed a nonsignificant group effect, *F* (5, 72) = 1.10, a nonsignificant Group × Spouse effect, *F* (5, 72) = 1.67, and a significant spouse effect, *F* (5, 72) = 470.79, *p* < .001. Univariate ANOVAs revealed no significant group differences on IBI, skin conductance, pulse transit time, or activity level. The Spouse × Group interaction approached significance for IBI, *F* (1, 71) = 3.65, *p* = .057, and for FPA, *F* (1, 71) = 3.81, *p* = 0.52. Compared with wives in regulated marriages, wives in nonregulated marriages had shorter IBIs, *t* (71) = – 2.13, *p* = .017, and smaller FPAs, *t* (71) = – 2.57, *p* = .006, than wives in regulated marriages. Husbands in the two types of marriages did not differ on IBI, *t* (71) = .42, *ns,* or FPA, *t* (71) = .12, *ns.*

There were significant spouse differences on IBI (wives' *M* = 764.68; husbands' *M* = 804.90), pulse transit time (wives' *M* = 236.55; husbands' *M* = 243.59), and activity level (wives' *M* = 1.78; husbands' *M* = 0.98). Wives had faster heart rates (smaller IBIs), faster transit times, and higher activity levels. The IBI and pulse transit time gender differences could be explained by the differences in activity level (Obrist, 1981) because, when activity levels were used as covariates, there were no longer gender differences in the residualized dependent variables for IBI, *F* (1, 75) = 0.05; or for finger pulse transit time, *F* (1, 75) = 0.00. Results from these analyses are presented in Table 4 . [9]

What RCISS Variable Is Active in Discriminating Regulated and Nonregulated Couples?

We defined regulated couples as those having significantly positive slopes for the cumulative ratio of positive to negative RCISS speaker for both husband and wife, whereas nonregulated couples did not have both slopes significantly positive. Thus, the variable we used to classify couples was a compound variable derived from multiple sources of information (positive and negative RCISS codes and data from husbands and from wives). We thought it important to evaluate which of these variables was doing the work in this classification.

To explore this question, we used four kinds of data: (a) positive speaker codes for husband and wife, (b) negative speaker codes for husband and wife, (c) difference between positive and negative speaker codes for husband and wife, and (d) ratio of negative to positive plus negative speaker codes for husband and wife. [10] For each kind of data, we conducted a stepwise discriminant function, attempting to predict whether couples were in the regulated or nonregulated groups. The variable selection criterion was minimizing the overall Wilks's lambda; variables were entered until the *F* ratio to enter the next variable was not significant at the .05 level.

We consider these to be exploratory analyses and will only compare the models qualitatively. Table 5 summarizes the results of the four discriminant function analyses. These analyses reveal that all four kinds of data were able to discriminate the regulated and nonregulated couples. Judging by the Canonical *R* s and the percentage correct classification, the ratio of negative to positive plus negative speaker codes did the best of all models. These results suggest that the best way of conceptualizing the classification we propose may indeed be a balance model between positive and negative affect.

Do RCISS Codes Contribute to the Prediction of Dissolution Beyond That Obtained From Self-Report Measures of Marital Satisfaction?

Correlations in our sample between Time 1 marital satisfaction and divorce were significant, but not very high ($r = -.23$, $p < .05$). To help determine whether RCISS behavioral codes accounted for additional variance, we computed correlations between husband and wife positive minus negative RCISS speaker codes and divorce, controlling for Time 1 marital satisfaction. These correlations were −.20 ($p = .072$) for husbands and −.25 ($p = .030$) for wives, suggesting that RCISS variables are accounting for some additional variance in divorce beyond that accounted for by Time 1 marital satisfaction.

Discussion

Cascade Model of the Path Toward Marital Dissolution

The cascade model of the path toward marital dissolution received some preliminary support. The use of structural equations modeling to explore models of causality in correlational data is controversial, and we wish to align ourselves with the most conservative interpretation of these methods. When applied to the cascade model of marital dissolution portrayed in Figure 2 , these analyses were consistent with the hypothesis that consistently low marital satisfaction led to considerations of dissolution, to eventual separation, and to divorce. Of course, except for the 1983 marital satisfaction, all data used to test this model were obtained in 1987. Thus, this notion of the temporal cascade must be considered only hypothetical.

One reason that the issue of a cascade model is important is because of the problem of low base rates of separation and divorce in short-term longitudinal samples. Although we had some success in predicting these outcomes, our data suggest that, consistent with a cascade model, it is easier to predict variables such as declining marital satisfaction and considerations of dissolution than it is to predict separation and divorce. A second issue related to the cascade model is that it is currently unknown whether the dissolution of marriages is part of the same process as the deterioration of marital satisfaction (as was suggested by Lewis & Spanier, 1982) or whether these are independent processes. Given the lack of knowledge from prospective research concerning this issue, it is of some interest that it was possible in the present study to scale the events leading to marital dissolution as a cascade. This supports the notion that there is continuity between these processes.

Regulated and Nonregulated Couples

The two types of couples, regulated and nonregulated, defined on the basis of RCISS behaviors, were found to differ in a number of ways.

Behavior.

Behavioral differences were further specified by examining the MICS and the SPAFF. Nonregulated couples were more conflict engaging, more defensive, more stubborn, more angry, more whining, more withdrawn as listeners, less affectionate, less interested in their partners, and less joyful than regulated couples. Despite this greater specificity, it is unlikely that all nonregulated couples exhibit all of these negative behaviors, or that all regulated couples exhibit all of these positive behaviors. RCISS point graphs take account of the *balance* between negative and positive affective behavior across a 15-min interaction. Stability in marriage is likely based in the ability to produce a fairly high balance of positive to negative behaviors (positive to negative ratios of approximately 5.0 in the present data) and not in the exclusion of all negative behaviors. Regulated couples maintain a balance in which positive codes exceed the negative, whereas nonregulated couples have a ratio in which the negative codes equal or exceed the positive. This represents a dramatic difference between the two groups in what might be considered a "set point" in interaction balance.

One can certainly raise questions about the richness of behavior that we analyzed. On the one hand, there is richness insofar as RCISS, MICS, and SPAFF sample emotions, emotional behaviors, and task-related behaviors, thus encompassing a number of different aspects of the interaction. On the other hand, there is a spartan quality to our method of classifying couples, which is based only on total number of positive and negative RCISS codes. Similarly, we only analyzed the MICS and SPAFF data in terms of total number of codes for each spouse. Sequential analysis of the transitions between specific codes as they unfold over time could provide a much richer basis for classification and description. However, this kind of analysis would require using much larger samples. For example, if the sequential analysis were limited only to the transitions between the 10 SPAFF codes, for the husbands and wives, at a single lag, the resulting matrix would be 20 × 20, thus adding 400 variables to the data set. In 15 min of interaction, for any given couple, most of these cells would be empty. Nonetheless, if these SPAFF codes were collapsed into more global codes (e.g., positive, neutral, and negative), then this kind of sequential analysis could be very informative in further specifying the qualities of interaction in these two types of couples. We hope to conduct such analyses on these data in the future.

Questionnaires and rating dial.

Nonregulated couples indicated that their marital problems were more severe. Rating dial data indicated that nonregulated couples felt more negative during the interaction than regulated couples. Clearly, these concomitants of nonregulated marriages, severity of marital problems and more negatively experienced interactions, do not bode well for the ultimate fate of the marriage.

In a biological realm, nonregulated couples reported being in poorer health than did regulated couples. Also, wives reported being in poorer health than husbands, a result consistent with Bernard's (1982) essay. Assuming that self-reports of illness are reasonable indicators of actual illness (e.g., McDowell & Newell, 1987), our results suggest that the health of men might be better buffered by marriage in general than that of women, and that the health of men might be better buffered from the negative health consequences of dysfunctional marriages than that of women.

Physiological variables.

The two kinds of couples did not differ very much in terms of physiological variables measured during discussion of marital problems. The two differences we obtained, shorter IBIs and smaller FPAs on the part of nonregulated wives, could be considered as troublesome signs, given our earlier findings that a high level of physiological arousal during marital interaction was a strong predictor of future declines in marital satisfaction (Levenson & Gottman, 1985). It should be noted that, even though our earlier work explored the relation between physiological arousal and changes in marital satisfaction (and not the relation between arousal and these two kinds of marriages), we did expect the physiological differences between regulated and nonregulated couples to be stronger. Similar analyses of change in marital satisfaction with the current data set yielded marginal results, but in the same direction as our previous work. [11] We will want to continue tracking the relation between physiology and the other variables of the cascade model to determine whether the predictive value of physiological variables is limited to predicting the early stages of the model (i.e., change in marital satisfaction) or whether these variables will also be useful in predicting more distal outcomes.

At a much more speculative level, wives' shorter IBIs and smaller FPAs may be related to the finding of lower health in wives and in nonregulated marriages. Smaller FPAs often reflect peripheral vasoconstriction, which results from heightened arousal in the alpha branch of the sympathetic nervous system. Similarly, shorter IBIs may also result from heightened arousal in the beta branch of the sympathetic nervous system (or from withdrawal of vagal restraint). High levels of sympathetic nervous system activity have been suggested as possible mediators of the relation between stress and disease (e.g., Henry & Stephens, 1977). Of course, the present data are only suggestive in this regard. Even if conclusive data linking these patterns of cardiovascular arousal to illness were available, we could not know, based on a brief 15-min sample of physiological data, whether nonregulated wives were chronically hyperaroused.

Regulated and Nonregulated Couples and the Cascade Model of Marital Dissolution

Compared with regulated couples, nonregulated couples were more likely to have entered the early stages of the cascade model and thus can be thought to be more likely ultimately to reach the final stage of the model: marital dissolution. In terms of the variables hypothesized to be precursors of divorce, nonregulated couples had significantly lower marital satisfaction scores in 1983 and 1987, were more likely to have considered dissolution, and were more likely to have separated than regulated couples. We were also able to use three Time 1 self-report variables and six Time 1 RCISS variables to discriminate, with a moderate level of prediction (i.e., canonical correlation of .52), couples who divorced from those who did not. Although this was a post-hoc analysis that requires cross-validation, it is encouraging when compared with the size of the predictions of divorce found in the literature, which range from the low .20s to the mid .30s.

One interesting finding was that the RCISS codes used to make the distinction between regulated and nonregulated couples were able to account for additional variance in divorce beyond that accounted for by the measure of Time 1 marital satisfaction. Although encouraging insofar as this indicates that behavioral measures may contribute something beyond that obtained with simple, inexpensive self-report measures, we do not wish to make too much of this point. In this study, when interaction and marital satisfaction variables were measured at Time 1, couples had been married an average of 5 years. Thus, it is obvious that whatever processes we are measuring have been going on for some time. We expect that nonregulated marital interaction and low marital satisfaction are comorbid symptoms of an ailing marriage and that they will prove to be very difficult to unravel.

Gender Differences in Regulated and Nonregulated Couples

A number of interesting differences emerged in the pattern of findings for husbands and wives, an issue we have explored previously (Gottman & Levenson, 1988). As indicated earlier, wives reported more illness than husbands. Gender differences were also observed in the SPAFF coding of emotional behavior: (a) wives showed more anger and whining than husbands, (b) wives showed less affection than husbands, and (c) husbands showed more neutral affect than wives. At first glance, the lack of significant interactions of Group (i.e., regulated vs. nonregulated) × Spouse suggests that these gender differences are not involved in the dissolution of the marriage. However, we would like to offer some speculation as to ways in which these gender differences might in fact play some role in marital dissolution.

Our observations of hundreds of marital interactions over the years has led us to hypothesize that wives are much more likely than husbands to take responsibility for regulating the affective balance in a marriage and for keeping the couple focused on the problem-solving task during the problem-area marital interaction. Wives do this in conflict-resolving discussions by actively expressing negative affect, which is consistent with the high-conflict task. In the nonregulated group, this normal affective role of wives is amplified, and it may be dysfunctional. Gottman (1979) found that husbands play a role in conflict deescalation, but only in less intense conflicts. In nonregulated marriages, both spouses may have relinquished their role in deescalating conflict. The relative primacy of negative affect over positive affect by wives in the nonregulated group and the greater tendency of couples to engage in and escalate conflict (and not deescalate conflict) may be an important element in this nonregulated couple's cascade toward marital dissolution.

Conclusion

The handful of previous longitudinal studies of marital dissolution have generally yielded results that have been quite weak and non-theoretical. The contributions of this work to the extant literature on the prediction of marital dissolution are as follows: (a) We suggest that there is a continuity between the processes of marital dissatisfaction and separation and divorce, and that this fact can assist the study of dissolution in short-term longitudinal research; (b) we suggest a parsimonious theory that may account for dissolution: It is a balance theory that proposes that martial stability requires regulation of interactive behavior at a high set point ratio of positive to negative codes of approximately 5.0; (c) we suggest that specific interactive and self-report variables accompany these high or low set points; (d) consistent with Bernard's observation, we suggest a mechanism for why the potential victims of an ailing marriage may be women, who are socialized in our culture to care for troubled relationships.

References

Bennett, N. G., Blanc, A. K. & Bloom, D. E. (1988). Commitment and the modern union: Assessing the link between premarital cohabitation and subsequent marital stability. *American Sociological Review, 53*, 127-138.
Bentler, P. M. & Newcomb, M. D. (1978). Longitudinal study of marital success and failure. *Journal of Consulting and Clinical Psychology, 46*, 1053-1070.
Bernard, J. (1982). *The future of marriage.* (New Haven, CT: Yale University Press)
Block, J. H., Block, J. & Morrison, A. (1981). Parental agreement—disagreement on child-rearing and gender-related personality correlates in children. *Child Development, 52*, 965-974.
Bugaighis, M. A., Schumm, W. R., Jurich, A. P. & Bollman, S. R. (1985). Factors associated with thoughts of marital separation. *Journal of Divorce, 9*, 49-59.
Burgess, E. W., Locke, H. J. & Thomes, M. M. (1971). *The family.* (New York: Van Nostrand Reinhold)

Cherlin, A. J. (1981). *Marriage, divorce, remarriage.* (Cambridge, MA: Harvard University Press)
Constantine, J. A. & Bahr, S. J. (1980). Locus of control and marital stability: A longitudinal study. *Journal of Divorce, 4*, 11-22.
Emery, R. E. (1988). *Marriage, divorce, and children's adjustment.* (Newbury Park, CA: Sage)
Gottman, J. M. (1979). *Marital interaction: Experimental investigations.* (San Diego, CA: Academic Press)
Gottman, J. M. & Krokoff, L. J. (1989). The relationship between marital interaction and marital satisfaction: A longitudinal view. *Journal of Consulting and Clinical Psychology, 57*, 47-52.
Gottman, J. M. & Levenson, R. W. (1985). A valid procedure for obtaining self-report of affect in marital interaction. *Journal of Consulting and Clinical Psychology, 53*, 151-160.

Gottman, J. M. & Levenson, R. W. (1988). The social psychophysiology of marriage.(In P. Noller & M. A. Fitzpatrick (Eds.), *Perspectives on marital interaction* (pp. 182—200). Clevedon, England: Multilingual Matters.)

Gottman, J., Markman, J. & Notarius, C. (1977). The topography of marital conflict: A sequential analysis of verbal and nonverbal behavior. *Journal of Marriage and the Family, 39*, 461-477.

Haynes, S. N., Follingstad, D. R. & Sullivan, J. C. (1979). Assessment of marital satisfaction and interaction. *Journal of Consulting and Clinical Psychology, 47*, 789-791.

Henry, J. P. & Stephens, P. M. (1977). *Stress, health, and the social environment.* (New York: Springer-Verlag)

Hetherington, E. M., Cox, M. & Cox, R. (1978). The aftermath of divorce.(In J. H. Stevens Jr., & M. Matthews (Eds.), *Mother—child, father—child relations* (pp. 7—38). Washington, DC: National Association for the Education of Young Children.)

Hetherington, E. M., Cox, M. & Cox, R. (1982). Effects of divorce on parents and children.(In M. Lamb (Ed.), *Nontraditional families* (pp. 233—288). Hillsdale, NJ: Erlbaum.)

Huberty, C. J. & Morris, J. D. (1989). Multivariate analysis versus multiple univariate analysis. *Psychological Bulletin, 105*, 302-308.

Kelly, L. E. & Conley, J. J. (1987). Personality and compatibility: A prospective analysis of marital stability and marital satisfaction. *Journal of Personality and Social Psychology, 52*, 27-40.

Krokoff, L. J., Gottman, J. M. & Hass, S. D. (1989). Validation of a global rapid couples interaction scoring system. *Behavioral Assessment, 11*, 65-79.

Larsen, A. S. & Olson, D. H. (1989). Predicting marital satisfaction using *PREPARE:* A replication study. *Journal of Marriage and Family Therapy, 15*, 311-322.

Lederer, W. J. & Jackson, D. D. (1968). *The mirages of marriage.* (New York: Norton)

Levenson, R. W. & Gottman, J. M. (1983). Marital interaction: Physiological linkage and affective exchange. *Journal of Personality and Social Psychology, 45*, 587-597.

Levenson, R. W. & Gottman, J. M. (1985). Physiological and affective predictors of change in relationship satisfaction. *Journal of Personality and Social Psychology, 49*, 85-94.

Levinger, G. & Moles, O. C. (Eds.) (1979). *Divorce and separation: Context, causes, and consequences.* (New York: Basic Books)

Lewis, R. A. & Spanier, G. B. (1982). Marital quality, marital stability, and social exchange.(In F. I. Nye (Ed.), *Family relationships, rewards and costs* (pp. 132—156). Beverly Hills, CA: Sage.)

Little, R. J. A. & Rubin, D. B. (1987). *Statistical analysis with missing data.* (New York: Wiley)

Locke, H. J. & Wallace, K. M. (1959). Short marital adjustment and prediction tests: Their reliability and validity. *Marriage and Family Living, 21*, 251-255.

McDowell, I. & Newell, C. (1987). *Measuring health: A guide to rating scales and questionnaires.* (New York: Oxford University Press)

Newcomb, M. D. & Bentler, P. M. (1981). Marital breakdown.(In S. Duck & R. Gilmour (Eds.), *Personal relationships,* (Vol. 3, pp. 57—94). San Diego, CA: Academic Press.)

Obrist, P. A. (1981). *Cardiovascular psychophysiology.* (New York: Plenum Press)

Rovine, M. J. & von Eye, A. (1991). *Applied computational statistics in longitudinal research.* (San Diego, CA: Academic Press)

Weiss, R. L. & Cerreto, M. C. (1980). Development of a measure of dissolution potential. *American Journal of Family Therapy, 8*, 80-85.

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 L. A. Hamerlynch, I. C. Handy, & E. J. Mash (Eds.), *Behavior change: The fourth Banff conference on behavior modification* (pp. 35—52). Champaign, IL: Research Press.)

Weiss, R. L. & Summers, K. J. (1983). Marital Interaction Coding System–III.(In E. Filsinger (Ed.), *Marriage and family assessment* (pp. 85—115). Beverly Hills, CA: Sage.)

1

We have not included a recent longitudinal study by Schaninger and Buss (1986) because this study only compared happily married and divorced couples, thus confounding marital satisfaction with marital stability. For the same reason, we have not discussed work by Olson (e.g., Larsen & Olson, 1989), whose questionnaire longitudinally differentiated those couples who divorced from those who remained together and were happily married.

2

An example item from the Locke—Wallace marital adjustment test is "Check the dot on the scale line below which best describes the degree of happiness, everything considered, of your present marriage."

3

An example item from the Cornell Medical Index is "Has a doctor ever said that your blood pressure was too high?" If a couple had divorced, the spouses were asked to provide the Time 2 data individually.

4

The correlations between marital type (as determined by slope) and the mean positive minus negative speaker codes, an alternative way of characterizing these relations that we considered less stable, were .69 for husbands and .78 for wives.

5

In all the literature of the MICS there is only one study that did not combine MICS codes into a global positive or negative (sometimes splitting by verbal and nonverbal) codes. This aggregating was never done consistently across studies. For example, across studies, disagreement was sometimes considered negative, sometimes not. There is actually almost no validity data on individual MICS codes available in the literature. One group of researchers who did not combine MICS codes was Haynes, Follingstad, & Sullivan (1979) , who found only a few differences: Satisfied couples were more likely to agree with their partners, less likely to criticize their partners, and more likely to be attentive listeners than dissatisfied couples. The summary codes used here were developed in a longitudinal study for predicting change in marital satisfaction (Gottman & Krokoff, 1989).

6

The $p = .05$ rejection level was adopted unless otherwise stated. All reported probabilities for statistical tests were found using a two-tailed test except for the three *z* tests of proportions for dichotomous dissolution variables, which were hypothesized and were conducted using a one-tailed test. For *t* tests, pooling was done unless the variances of the two samples were found to be significantly different. Those *t* tests in which pooling was not used can be identified in the text by their having fewer than 71 degrees of freedom. Missing data for all variables were estimated conservatively by replacing each missing observation by the mean for that group, or by the grand mean if subjects could not be recontacted on follow-up. Degrees of freedom for the error terms were reduced by the number of missing values estimated for each variable, and *F* ratios were recalculated (see Little & Rubin, 1987 ; Rovine & von Eye, 1991).

7

We should point out that structural equations models are only plausibility models. They suggest the strength of association among various links in the model, once we have assumed that they are causally related and ordered in a particular manner. To the extent that a model is consistent with the statistical associations, the model is judged more plausible. To explain the statistics of this process, if the model fits the data, the chi-squared statistic must be nonsignificant. The significance of individual path coefficients is evaluated by considering a *z* score of 1.96 or greater as significant at $p < .05$. We used the Bentler computer program EQS for these analyses, which does not assume that the data are normally distributed (a necessity for the separation and divorce variables, which are likely to be binary or Poisson distributed).

8

Our reported analyses were conducted in terms of the two marital types defined on the basis of the RCISS slopes. In response to reviewer suggestions, we evaluated two alternatives. For the first alternative, we used the slope of the RCISS point graphs as a continuous variable. The slope of the husband's point graph correlated − .28 with divorce, $p < .05$, and − .18 with separation, *ns.* The wife's slope correlated − .32 with divorce, $p < .01$, and − .26 with separation, $p < .05$. For the second alternative, we split the sample at the median for husband and wife mean positive and negative speaker codes per turn. ANOVAs revealed that only husband negative speaker codes significantly predicted divorce, and wife negative speaker codes significantly predicted separation. Thus, in terms of the dissolution variables, neither of these alternatives added much to the results. Furthermore, only the original regulated—nonregulated classification yielded results consistent with a Guttman scale of marital dissolution.

9

The baseline used in this research is an eyes-open, silent, 5-min preconversation period with spouses sitting face to face. In previous studies using this procedure (Levenson & Gottman, 1985), we have discussed how this period can be quite emotionally arousing and therefore does not constitute a true baseline. Not surprisingly, in the present study, analyses of physiological variables computed as changes from this preconversation baseline added nothing to our results. In current research we have added an initial eyes-closed baseline to provide a more valid physiological baseline.

10

Ratios of positive to negative codes have been used in past research on marital satisfaction (e.g., the ratio of agreement to agreement plus disagreement, Gottman, 1979 ; the ratio of pleasing to displeasing events recorded in the Spouse Observation Checklist diary measure, Weiss, Hops, & Patterson, 1973).

11

The current data are actually quite consistent with those of our initial study. When we performed an analysis of covariance on change in marital satisfaction, controlling initial level, we found marginally significant group effects for husband's IBI, $F(1, 71) = 3.55$, $p < .10$ (couples who decreased in marital satisfaction had a mean husband IBI of 768.69, and couples who increased had a mean husband IBI of 830.55), for husband's pulse transit times, $F(1, 71) = 3.01$, $p < .10$ (couples who decreased in marital satisfaction had a mean husband pulse transit time of 239.79, and couples who increased had a mean husband pulse transit time of 246.63), and for wife's skin conductance, $F(1, 71) = 3.02$, $p < .10$ (couples who decreased in marital satisfaction had a mean wife skin conductance of 11.68, and couples who increased had a mean wife skin conductance of 9.89).

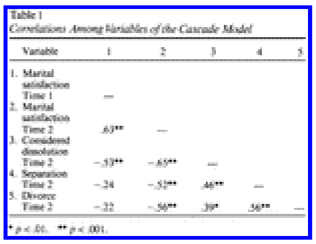
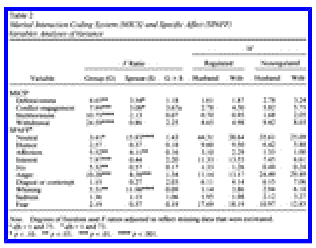
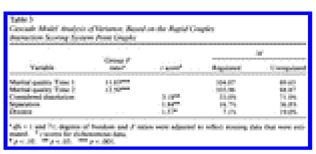


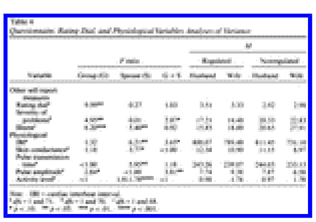
Table 1
Correlations Among Variables of the Cascade Model

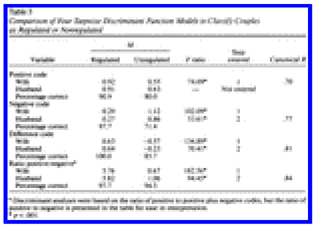
Variable	1	2	3	4	5
1. Marital satisfaction Time 1	—				
2. Marital satisfaction Time 2	.63**	—			
3. Considered dissolution Time 2	−.53**	−.65**	—		
4. Separation Time 2	−.24	−.52**	.46**	—	
5. Divorce Time 2	−.22	−.56**	.39*	.56**	—

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

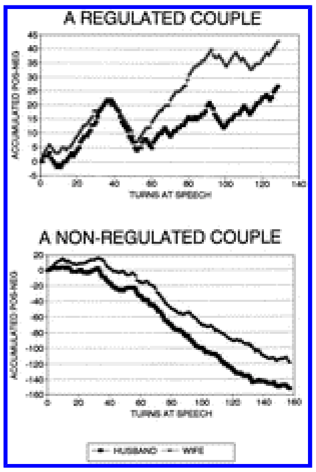








Example of speaker point graphs for the regulated and nonregulated groups. (Pos—neg = ratio of positive to negative.)



Structural equation model of the cascade model of marital dissolution and a model that assumes no cascade (only common method variance).