A Theory of Marital Dissolution and Stability

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ABSTRACT

Research is presented on the prospective longitudinal prediction of marital dissolution. First, a cascade toward marital dissolution is described. Second, the cascade is predicted with variables from a balance theory of marriage. Third, there are process and perception (the distance and isolation cascades) cascades related to the cascade toward dissolution. The importance of "flooding" is discussed, as well as a mechanism through which negative perceptions (which are 2 dimensional) become global and stable and through which the entire history of the marriage is recast negatively. The role of physiology is outlined. A theory is presented in which a "core triad of balance" is formulated in terms of 3 weakly related thermostats (connected by catastrophe theory) and related to the distance and isolation cascade. Implications for a minimal marital therapy are discussed.

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Today separation and divorce are common phenomena. Separation appears to be a trustworthy road to divorce rather than to reconciliation. When couples separate, about 75% of these separations will end in divorce (Bloom, Hodges, Caldwell, Systra, & Cedrone, 1977). Current estimates put the divorce rate in the United States somewhere between 50% (as of 1970; Cherlin, 1981) and a startling 67% (as of 1989; Martin & Bumpass, 1989). The divorce rate for second marriages tends to be about 10% higher than the rate for first marriages (Glick, 1984). Researchers now know that separation and divorce have strong negative consequences for the mental and physical health of both spouses. These negative effects include an increased risk for psychopathology, an increased number of automobile accidents–some resulting in fatalities–and an increased incidence of physical illness, suicide, violence, homicide, and mortality from diseases (for a review, see Bloom, Asher, & White, 1978). Marital disruption may not merely be related to these negative life events, it may actually be among the most powerful predictors of them (Holmes & Rahe, 1967). There is even evidence from one large sample 9-year epidemiological prospective study on the predictors of dying or staying alive that the stability of a marriage is the best predictor of these two phenomena, even when controlling for factors such as initial health and health habits (Berkman & Syme, 1979 ; Berkman & Breslow, 1983). The Berkman and Syme study suggests that the health-buffering effects of marriage are all granted to men, consistent with suggestions made by Bernard (1982) . However, recent research (Gottman & Levenson, 1992 ; Kiecolt-Glaser et al., 1987 ; Kiecolt-Glaser et al., 1988) suggests that the opposite is true, namely, that an ailing marriage or marital dissolution most strongly affects the physiological functioning of women. Studies are not consistent in this regard (e.g., cf. Levenson & Gottman, 1985), but, in general, the evidence does not support Bernard's contention. To resolve this inconsistency of costs and buffers offered by marriage as a

function of gender, Gottman (in press) found that the illness of women is directly affected by marital distress, whereas for men it is mediated through loneliness. He speculated that this result is probably due to the relatively meager social support systems of men as compared with those of women; these systems for most men are restricted to their wives. It is probably the case that an ailing marriage negatively affects the physiology of both partners.

Also, there is now convincing evidence to suggest that marital distress, conflict, and disruption are associated with a wide range of deleterious effects on children, including depression, withdrawal, poor social competence, health problems, poor academic performance, and a variety of conduct-related difficulties (P. A. Cowan & Cowan, 1987 , 1990 , 1992 ; Easterbrooks, 1987 ; Emery, 1982 , 1988 ; Emery & O'Leary, 1982 ; Forehand, Brody, Long, Slotkin, & Fauber, 1986 ; Gottman & Katz, 1989 ; Hetherington, 1988 ; Hetherington & Clingempeel, 1992 ; Hetherington, Cox, & Cox, 1978 , 1982 ; Howes & Markman, 1989 ; Katz & Gottman, 1991a , 1991b ; Peterson & Zill, 1986 ; Porter & O'Leary, 1980 ; Rutter, 1971 ; Shaw & Emery, 1987 ; Whitehead, 1979). There is evidence from two U.S. national probability samples that adults who experienced a divorce as children are under considerably more stress than those who did not (Kulka & Weingarten, 1979 ; Glenn & Kramer, 1985). These adults report less satisfaction with family and friends, greater anxiety, that bad things more frequently happen to them, and that they find it more difficult to cope with life's stresses in general. There is also evidence for a reasonably reliable phenomenon of the intergenerational transmission of divorce, but the effect is not large (e.g., see Pope & Mueller, 1979 , p. 109), and this relationship is not found in every study. For example, in the Kelly and Conley (1987) 35-year prospective study these relationships were not statistically significant (although the trend was there).

Despite these negative consequences of marital dissolution, researchers still do not understand how marriages may be patterned in some way that spells their eventual destruction. In decade review papers, both White (1990) and Price-Bonham and Balswick (1980) noted that little is known about the marital processes that may be predictive of divorce. The research agenda is relatively clear. What needs to be known is whether there are specific trajectories toward marital dissolution or marital stability that are systematically related to the qualities of a marriage. Furthermore, this knowledge must come from prospective longitudinal studies rather than from retrospective accounts of failed marriages (e.g., Ponzetti & Cate, 1988 ; Vaughn, 1990), as reconstructions of the past are notoriously unreliable. Critical in this research agenda are two goals: good prediction of which couples will be on which trajectory and a highly specific empirically based theory of the marital processes associated with dissolution.

Previous Studies Predicting Dissolution

Empirical research has not been very successful at predicting which married couples will separate or divorce and which married couples will stay together. The epidemiological attempts at understanding the changes in divorce in this century have not tried to predict which couples in a cohort might divorce. Instead, demographic correlates of stability have been studied, and epidemiologists have attempted to discover variables that would show the same kinds of patterns over time as the divorce rate time-series and that could reasonably account for variation in divorce rates over time (see Cherlin, 1981). Lamentably, studies attempting to specify interactional behaviors and processes that are antecedents of marital dissolution have been quite rare. The current lack of knowledge concerning which patterns of marital interaction lead to marital dissolution stems in part from the fact that, in most studies, divorce and separation have been viewed as independent rather than dependent variables. This means that 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 many published studies to date with the terms *marital separation* or *divorce* in their titles, only six are prospective longitudinal studies that have attempted to predict future separation and divorce (Block, Block, & Morrison, 1981 ; Bentler & Newcomb, 1978 ; Constantine & Bahr, 1980 ; Fowers & Olson, 1986 ; Kelly & Conley, 1987 ; Sears, 1977). What did these studies find? Fowers and Olson (1986) were completely unable to predict divorce or separation with their instrument called PREPARE, which assesses disagreements between prospective spouses in 11 different areas. Unfortunately, these authors also combined separated and divorced couples into one group. This is a mistake because the correlates of separation may not be identical to the correlates of divorce, and it is important to keep them apart for the time being until more is known. The PREPARE instrument does not discriminate between couples who were less happily married but stayed together and couples who separated or divorced. Fowers and Olson reported only a discriminant analysis between the happily married and those who separated or divorced, thus confounding two factors, marital status and marital happiness. For PREPARE, they claimed as validity evidence its high correlations with marital satisfaction, so it is likely that what they were in fact measuring with PREPARE was one aspect of marital satisfaction (probably consensus, as the instrument ostensibly assesses consensual agreement on 11 areas of marriage). Markman, Floyd, Stanley, and Storaasli (1988) critiqued the commonly held belief that compatibility between prospective spouses ensures marital stability. They quoted G. Levinger (1966) as suggesting that what may count is not compatibility, but how the couple handles the inevitable incompatibilities they will encounter.

Then there is a prospective study by Sears (1977) . There is an interesting history to the Sears prospective study. Terman and Oden (1947) had reported that a self-report measure of emotional stability administered to gifted subjects when they were 7 to 14 years old was related to marital happiness 18 years later (the relationship, although statistically significant, was only 0.25). In fact, in 1940 Terman actually developed a "marriage aptitude test" to give to his young geniuses. The concurrent correlation of Terman's marital aptitude score with marital satisfaction was 0.62, and the relationship was mainly due to what he called "neuroticism" items, not childhood family background. It turned out, in fact, that the members of the couples who divorced between 1940 and 1946 had marital aptitude scores that were a standard deviation below those who stayed married. Sears later related these 1940 marital aptitude scores to marital outcome in 1972 (When the average age of the original subjects was 62). The correlations were 0.28 for women and 0.12 for men. Although for women this correlation was statistically significant, the prediction was quite weak. Kelly and Conley (1987) were strongly influenced by the weak Sears result and added the commendable innovation that the personalities of their subjects should not be assessed by self-report but rather by other people in the subjects' friendship networks.

Next is a prospective study of divorce (Block et al., 1981) that emerged from the landmark longitudinal study of child development by the Blocks. The Blocks used these data to search their data to determine whether they had any precursor predictors of parental divorce. In the Block et al. article, one variable emerged as a predictor. Parental disagreement about child rearing practices from 57 families when the child was 3.5 years old significantly discriminated between the intact and divorced groups 10 years later.

Constantine and Bahr (1980) , in a 6-year longitudinal study, interviewed over 3,500 men between the ages of 14 to 24 years by telephone. The study used an 11-item subscale of the 29-item scale of Rotter (1966) ; an example of the items was "Many of the unhappy things in people's lives are partly due to bad luck." Men who divorced or separated in the 6-year period were compared with men who remained married. The total score on the locus-of-control measure was not significantly related to marital stability. Although there was a similar lack of statistical significance on the Fate scale (belief that events are due to luck or fate) and the Personal scale (belief that a person's own behavior influences his reinforcements), the Leadership scale discriminated the two groups: The stable group had a more internal orientation (meaning that the men who remained married thought that becoming a leader was

due to skill and not luck). It is hard to know what to make of this result.

Bentler and Newcomb (1978) used the Bentler self-report personality test with 77 newlywed couples who were followed for 4 years. Separated and divorced couples were combined into one category. They found that couples who remained married were more similar in age, interest in art, and attractiveness than couples who separated or divorced, although husband—wife differences were not statistically significantly different across the groups for any dimension. 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. These personality dimensions do not provide a clear theoretical picture, nor do they tell us about the dynamics of marriage that might be associated with a longitudinal course toward dissolution.

Kelly and Conley (1987) had acquaintances of the couple rate the partners' personalities. Theirs was a prospective 35-year longitudinal study of marital stability. They reported that the men who remained married were more conventional, 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 tension in their families of origin. Unfortunately, Kelly and Conley reported no statistical tests in their article. However, in a prepublication version of the article that they sent to me (Kelly & Conley, 1985), they reported that the stably married and divorced groups differed by about two thirds of a standard deviation on the discriminant function. It is frustrating not to have statistical tests for this important study. Nonetheless, this latter result can be translated into an equivalent point-biserial correlation coefficient of 0.25 (see Glass & Stanley, 1970 , p. 163, Equation 9.5). These results suggest that adjusted people have more stable marriages. A rival hypothesis is that the friends of the couples, who presumably have intimate knowledge of their friends and the marriages, used the personality items to tap a dimension of distressed marital interaction patterns or negative perceptions of the marriage that they observed in socializing with their friends. That is, the validity of the friends' ratings of personality variables was not first clearly established. Terman, Buttenweiser, Ferguson, Johnson, and Wilson (1938) found that the judgments of a couple's friends of their marital satisfaction correlated about 0.60 with the couple's actual marital satisfaction.

The findings from this handful of studies are not conclusive. In fact, they are somewhat hard to integrate. Although effect sizes in these studies were not particularly large, the fact that they had any ability to predict dissolution at all is encouraging for additional efforts at longitudinal prediction using the same and other methods. 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.

Recent Findings From Laboratories of Levenson and Gottman

In this article I summarize some of the major findings on the longitudinal study of couples to date and present a theoretical formulation that organizes these results. The basic paradigm in our laboratories is one that collects simultaneous synchronized videotapes and psychophysiological measures. Couples are videotaped talking about the events of the day, a major area of continuing disagreement in their marriage, or a pleasant topic or they spend 24 hr in an apartment laboratory as they normally would at home. The tapes are later coded for specific emotions, facial expressions of emotion, problem-solving behaviors, and visual gaze patterns. After the interaction, a video recall procedure is used to obtain a continuous self-report of affect. Couples are also interviewed about their perceptions of specific moments in the interaction and information is obtained during these moments about their experience,

thoughts, expectations, thoughts about the partner, hopes, and attributional processes. Several years later couples are recontacted, and researchers perform a variety of follow-up assessments about marital quality and stability. What are the basic results?

There Is a Trajectory or Cascade Toward Divorce

The problem with doing a 35-year longitudinal study such as Kelly and Conley's (1987) is that in 35 years people may not be very interested in your variables because the field may have changed so much. However, there is an important methodological problem that needs to be solved in conducting short-term longitudinal research on divorce. This is a problem whenever one attempts to predict a rare event. For example, in the research on myocardial infarction, it would be helpful to have a set of precursor predictor variables such as angina, shortness of breath, specific pain in the throat or left arm, and so on that are easier to predict than the relatively rare event of a heart attack. What needs to happen is that a Guttman scale of these precursors needs to be identified. One would then expect that the predictors of the trajectory toward the rare event would predict the precursors better than the rare event. This would be the expected pattern if the *trajectory* were being predicted.

Such a scale of precursor events has been developed. In two longitudinal studies (Gottman & Levenson, 1992 ; Gottman, in press), Gottman and Levenson have discovered that there is a specific trajectory toward marital dissolution that forms a Guttman scale of precursor predictor variables. This scale suggests that couples who divorce remain unhappily married for some time, seriously consider dissolution, then actually separate and then divorce (see Figure 1).

This analysis revealed that in Study 1, the model in Figure 1a fit these data well, with a nonsignificant χ^2 4, $N = 73 = 7.09$, $p = .13$, and a normed Bentler-Bonnett goodness-of-fit statistic of 0.994 (which is sufficiently close to 1.0 to indicate a good fit); the model for Study 2 in Figure 1b also fit the data well, with χ^2 3, $N = 52 = 4.63$, $p = .20$ and a Bentler-Bonnet norm of .998. Although this *cascade* may seem obvious, it actually has been the subject of some debate as to whether there is a continuum between research on marital satisfaction and marital dissolution.

The Cascade Toward Marital Dissolution Can Be Predicted With Just Two Variables, Which Are Based on a Balance Theory of Marriage

Using an observational system (called the Rapid Couples Interaction Scoring System, or RCISS) for Time 1 data the accumulated positivity minus negativity in the two speakers' interaction over time is graphed and couples are divided into two groups, those whose curves have positive speaker slopes (balance favors positivity), called "regulated," and all other couples (balance does not favor positivity), called "nonregulated." These two groups of couples can be distinguished with other observational systems as well (Gottman & Levenson, 1992), and they are significantly different in their trajectories toward dissolution or stability over time. To give the reader an idea of the results, we found that in a regression using the husband and wife's speaker RCISS slopes, nonregulated couples were significantly more likely to have been unhappily married at both Times 1 and 2, $F (2, 70) = 10.01$, $R = 0.46$, $p < .001$; $F (2, 70) = 6.39$, $R = 0.38$, $p < .01$, respectively; husbands and wives were more likely to have seriously considered dissolution, $F (2, 70) = 3.60$, $R = 0.29$, $p < .05$; $F (2, 70) = 4.68$, $R = 0.33$, $p < .05$, respectively; and husbands and wives were more likely to have separated and divorced, $F (2, 70) = 5.03$, $R = 0.34$, $p < .01$; $F (2, 70) = 7.09$, $R = 0.40$, $p < .01$, respectively–(see Gottman, 1993). Discriminant analyses suggested that both positive and negative RCISS speaker behavior contributed to the prediction and that the ratio between negative and positive RCISS codes was the best discriminator. Hence, there is some evidence that a balance model provides a suggestion that what is being regulated in regulated marriages is a balance between positivity and negativity.

Not All Negativity Is Equally Corrosive: The Four Horsemen of the Apocalypse

There were some negative acts that were more predictive of dissolution than others. For example, anger was not predictive of separation or divorce, but the husband's defensiveness, contempt, and stonewalling (the listener's withdrawal from interaction) were predictive of divorce ($r = 0.42$, $p < .001$; $r = 0.25$, $p < .05$; $r = 0.29$, $p < .01$; respectively), whereas the wife's criticism was predictive of separation ($r = 0.36$, $p < .001$), and her criticism, defensiveness, and contempt were predictive of divorce ($r = 0.26$, $p < .05$; $r = 0.38$, $p < .001$; $r = 0.34$, $p < .01$; respectively). By means of a global specific emotions coding system, the wife's contempt and disgust were found to be particularly predictive of marital separation ($r = 0.24$, $p < .05$). On the basis of only facial expression coding with Ekman and Friesen's (1978) Emotion Facial Action Coding System (EMFACS) system, the frequency of the wife's facial expressions of disgust correlated 0.51 ($p < .001$) with the number of months the couple was to separate in the next 4 years. A structural model supported a *process cascade* in which criticism leads to contempt, which leads to defensiveness, which leads to stonewalling. The results suggest that these four processes are particularly corrosive to marital stability. We also found that stonewalling is characteristically male and that a man's stonewalling is associated with the physiological arousal of both spouses (Gottman, in press). By means of both the RCISS observational coding and the Marital Interaction Coding System (MICS) coding, it was possible to construct structural equations models of this process cascade (see Figure 2). Figure 2 shows that these four variables for both the RCISS and the MICS form a Guttman-like scale. For the RCISS, $\chi^2 2, N = 73 = 0.00, p = 1.00$, whereas for the MICS $\chi^2 2, N = 73 = 0.82, p = 0.66$. These figures show that there is considerable consistency in this Guttman-like scaling of processes. These analyses show that such a Guttman-like scaling model is consistent with these data.

There Is a Process Cascade That Relates to the Couple's Perception of the Relationship and That Also Predicts Dissolution

A set of five questionnaires formed a cascade, using structural equations modeling. This cascade is called the *distance and isolation cascade.* The theoretical speculation is that this cascade begins with *flooding.* Flooding is measured with a questionnaire in which the subject endorses items that claim that the partner's negative emotions are unexpected ("seem to come out of nowhere"), unprovoked, intense, overwhelming, and disorganizing and that the partner will do anything to terminate the interaction (e.g., run away). The other variables in the distance and isolation cascade are perceiving the marital problems as severe, thinking that it is better to work out problems alone, having arranged their lives as more in parallel (they don't eat together as often as they used to, they are more likely to have separate friends, etc.), and loneliness in the marriage. The flooding variable is correlated significantly with behavior (e.g., RCISS speaker slopes). There are gender differences in flooding that suggest that men are flooded by less intense negative affects and behaviors than women (merely criticism is necessary for men to feel flooded, but contempt is necessary for women to feel flooded). This cascade is illustrated by the structural model of Figure 2b . The model in Figure 2b fits the data, with $\chi^2 1, N = 52 = 1.69, p = .19$, Bentler-Bonnett normed index = .998.

During Marital Conflict, the Perception of Positive Affect Is One Dimensional, Whereas the Perception of Negative Affect Is Two Dimensional

In a study of marital violence conducted with 158 couples (in collaboration with N. Jacobson), we examined the couples' self-report of their emotional experience during their most positive and most negative moments in the interaction (determined by the video recall rating dial). We found (Gottman, in press) that their self-ratings of their emotional experience (on the Rushe affect checklist) factored into one dimension for positive moments, with all the positive affects loading on this factor. However, for negative moments, there were two factors. One factor could be summarized as hurt and righteous

indignation (sadness, anger, and contempt); it contained thoughts of retaliation. The second factor could be described as hurt and perceived attack (internal whining, innocent victimhood, fear, and worry). Both types of responses are likely to represent *distress-maintaining* cognitions.

The theoretical challenge is to test whether these momentary perceptions of the interaction are related to more global and stable cognitions about the partner and the marriage. This would provide an important link with attribution theory research on marriage. The well-known attribution effects in marriage (e.g., see Fincham, Bradbury, & Scott, 1990) suggest that in unhappy marriages people develop hypotheses about their partner's behavior that are very hard to disconfirm. Positive behavior is attributed to fleeting, situational causes, whereas negative behavior is attributed to the stable and global negative traits of the partner. Holtzworth-Munroe and Jacobson (1985) used indirect probes to investigate when couples might "naturally" search for causes of events and what they conclude when they do search for causes. They found evidence for the hypothesis that distressed couples engage in more attributional activity than nondistressed couples and that attributional thoughts primarily surround negative impact events. They concluded that nondistressed couples engaged in relationship-enhancing attributions, whereas distressed couples engaged in distress-maintaining attributions. Distress-maintaining attributions maximize the impact of negativity and minimize the impact of positivity of the partner's behavior. Moreover, Holtzworth-Munroe and Jacobson pinpointed an important gender difference: Distressed husbands generated more attributions than nondistressed husbands, but distressed and nondistressed wives did not differ in this regard. They suggested that normally men may not engage in much attributional activity but that they outstrip women once relationship conflict develops.

Relationship-enhancing attributions were responses to positive partner behavior in both groups of couples. Relationship-enhancing attributions minimize the impact of the negative behaviors and maximize the impact of the positive behaviors of the partner. In an experimental study by Jacobson, McDonald, Follette, and Berley (1985) , distressed and nondistressed couples were randomly assigned instructions to act positive or to act negative. Jacobson et al. found that distressed couples were likely to attribute their partners' negative behavior to internal factors, whereas nondistressed couples were likely to attribute their partners' positive behavior to internal factors. Thus, these attributions, once established, make change less likely to occur. Behaviors that should disconfirm the attributional sets tend to get ignored, whereas behaviors that confirm the attributional set receive attention.

Attributional processes may tap the way couples think in general about the marital interaction as it unfolds with time. Attributions and general thought patterns about negative behaviors may thus be theoretically useful in providing a link between the immediate patterns of activity seen in behavioral interaction and physiological response and more long-lasting and more global patterns that span longer time periods. It might be the case that these more stable aspects of the marriage are better predictors of long-term outcomes, such as divorce, than those that can be obtained from behavioral observation. The content dimensions of negative attributions that have been studied include *locus* (partner, self, relationship, or outside events), *stability* (e.g., due to partner's trait or to a state that is situationally determined), *globality* (how many areas of the marriage are affected), *intentionality* (negative intent–selfish vs. unselfish motivation), *controllability, volition,* and *responsibility* (e.g., blameworthiness). Fincham, Bradbury and Scott (1990) reviewed experimental evidence for this phenomenon and concluded that, by and large, these patterns had been pretty well established by research. For attributions about negative events, 100% of the studies reviewed supported differences between happily and unhappily married couples on the two dimensions of globality and selfish versus unselfish motivation.

Negative Momentary Perceptions of the Interaction Were Related to Attributions and to Flooding

These Rushe self-ratings of emotional experience during couples' most negatively rated moments were related to flooding and to the Fincham-Bradbury attribution items assessing globality, stability, and

selfishness of the partner's negative behavior. Hence, these momentary negative perceptions are related to more lasting cognitions about the marriage.

Flooding and Hypervigilance Through Escape Conditioning

I suggest that flooding leads to emotional (escape) conditioning, which causes a state of *hypervigilance* to the cues conditioned to the flooding. As has been proposed in the attributional literature without explanation, I suggest that the flooded person then begins to distort ambiguous cues in the biased direction of seeing them as threatening or frustrating (producing either thoughts of innocent victimhood or righteous indignation). This causes the well-known negative attributional state in which it is very difficult for the partner to disconfirm the negative attribution by positive acts because they are attributed to fleeting, situational causes, whereas the negative acts of the partner are attributed to lasting, stable traits of the partner. A nondisconfirmable hypothesis thus emerges. Once flooding occurs, the distance and isolation cascade begins, leading to an emotional divorce within the marriage. Flooding is related to viewing one's marital problems as severe, believing that it is better to work out problems alone, arranging the marriage so that the partners' lives are more in parallel rather than interdependent, and loneliness. There is one further generalization of negative cognitions that we have detected. Further stabilization of negative cognitions may lead to the nondisconfirmable hypothesis, which generalizes to a global negative view of the entire relationship, its history, meaning, and philosophy. Buehlman, Gottman, and Katz (1992) presented evidence that the couple's view of their history (coded from the Oral History Interview; Krokoff & Gottman, 1984) significantly predicted divorce and correlated with behaviors and other negative affects that predict marital dissolution.

Physiological Reactivity and Chronically High Levels of Physiological Arousal Are Related to Divorce Prediction

In the Buehlman et al. (1992) report, some of the Oral History variables predictive of divorce correlated with physiological reactivity (elevation over and above a baseline). In this study, we also found (but did not report in Buehlman et al.) that chronic levels of physiological arousal in the husband (in addition to reactivity) were strongly predictive of divorce. In particular, in this study we included a situation in which couples relaxed with their eyes closed before the interview that set up the conflict discussion. We thought that arousal differences on this baseline would be a more reliable reflection of chronic activation than the eyes-open baseline obtained after the interview and before the conflict discussion. We found a significant result for the husband's heart rate in correlation with divorce. This was also true in the eyes-closed baseline that preceded the interview about the marital conflict, when, presumably couples would be less likely to be autonomically aroused. No other physiological variable was significantly correlated with divorce. However, the husband's baseline eyes-closed heart rate was also a significant predictor of separation ($r = -.28$, $p < .05$). The wife's baseline activity level was a significant predictor of the husband's later considerations of dissolution ($r = .41$, $p < .01$); this was also the case for her activity level during the interaction ($r = .44$, $p < .01$), and with her considerations of dissolution for the eyes-closed baseline ($r = .29$, $p < .05$). A set of t-tests conducted on the husband's interbeat interval showed that these correlations were associated with large Time-1 differences in heart rate between couples who eventually divorced and couples who stayed together. For the eyes-closed baseline, $t(51) = 2.62$, $p < .05$; for the eyes open baseline, $t(51) = 2.69$, $p < .01$. The means for the eyes-closed baseline for the husbands of the couples who eventually divorced compared to those who remained stable differed by over 11 beats per minute (BPM). This represents quite a large effect in the psychophysiological literature, in which heart rate effects are typically of the order of 4 to 5 beats a minute. The divorced mean was 84.49 BPM and the stable couples' husband's mean was 73.43 BPM; for the conflict interaction, $t(51) = 2.57$, $p < .05$, divorced mean = 85.50 BPM, and stable mean = 75.20 BPM.

At the time of this writing, the precise role of physiology remains open, as there is not consistency from study to study as to whether husbands or wives in ailing marriages are more aroused or more physiologically reactive (cf. Gottman & Levenson, 1992 ; Gottman, in press). A speculative view of the role of physiology in relation to information processing and access to creative and non-overlearned behavior patterns and cognitions can be found in Gottman (1990) . A more complete discussion of this question can be found in Gottman (in press-b, Chapter 14) .

There Are Three Types of Stable Marriages

Gottman (1993) presented a typology of marriages, using the RCISS speaker and listener cumulative point graph slopes. There was evidence for three types of stable couples: The *volatile* couple was the highest in emotional expressivity, the *validating* couple intermediate, and the *conflict-avoiding* couple was the lowest. They could be distinguished from one another in the amount and timing of persuasion attempts: Volatile couples began their persuasion in the first third of the interaction when feelings were first being expressed and remained high throughout the interaction; validating couples peaked in the middle third (the usual arguing phase, see Gottman, 1979); conflict-avoiding couples seemed never to engage in persuasion attempts. All three groups of stable couples had a positive-to-negative ratio of 5:1 (no significant differences between the three groups), whereas for unstable marriages the ratio was 0.8:1 (i.e., there was more negativity than positivity). Gottman (1993) analyzed these results using a predatorprey model of behavior, suggesting that in a marriage there is a balanced behavioral ecology; he suggested that some set points in this ecology favor stability, whereas others favor instability. Gottman (in press) proposed the hypotheses that these are the entire range of necessary adaptations to ensure a stable marriage and that all unstable marriages represent failures at being able to negotiate one of these stable styles (i.e., all "mixed" styles will be unstable longitudinally). These three styles of marriage are different on many other dimensions, and the derived typology strongly resembles Fitzpatrick's (1988) typology of happily married couples. Fitzpatrick used a questionnaire to divide couples into three pure types, and, in a series of studies, she correlated the typology with behaviors, attitudes, and perceptions. Fitzpatrick's samples did not include unhappy couples, nor were couples followed longitudinally.

The existence of the typology suggests that variables that Raush, Barry, Hertel, and Swain (1974) originally proposed as potentially dysfunctional in a marriage are not actually dysfunctional. In particular, Raush et al. proposed the idea that both escalating quarrels about seemingly trivial issues and the avoidance of conflict are potentially harmful in a marriage. However, volatile couples do in fact engage in escalating quarrels about almost any issue; they seem to have an ethic of honest exploration of all feelings on any issue at any time. However, they balance this direct confrontation and persuasion with high levels of positivity (affection and humor). Conflict-avoiding couples also are quite stable longitudinally; what is central to their marriage is the absence of persuasion attempts, the affirmation of shared beliefs, and the minimization and isolation of conflict (e.g., "agreeing to disagree"). Each type of marriage is likely to represent a necessary adaptation that ensures a stable marriage, each with its own rewards and costs and each with its own comfort level of emotional expression. Cultures are likely to differ in the distribution (and preference for) these three types.

Theoretical Formulation

I now present the outline of a theory that integrates these results using a theoretical framework of "systems of systems" recently devised by the Swiss theoretical physicist, Roland Fivaz (Fivaz, 1991 , in press). Some of my theoretical formulation is speculative. Fivaz's thinking is based on a generalization of thermodynamics, which concerns the physics of heat. In Fivaz's thinking, a simple set of *conjugate* variables is required to describe the behavior of a wide class of systems. I do not define the term *conjugate* in general, but in Newtonian mechanics, position and momentum are conjugate variables. In

Fivaz's general notation, these conjugate sets of variables are represented by P and Q, and I speak in this theory of P-space and Q-space. He calls the P variables the *flow variables,* and the Q variables the *order variables.* Because these ideas are rather esoteric–except, perhaps for those readers who are familiar with some physics–I think that placing them in the realm of marriage and making them more concrete should make them more accessible.

In the theory I wish to formulate, the P variables are simply the cumulative (or integrated) sum over time of positive minus negative behaviors (such as in the RCISS point graphs or emotion codes). In general, one can think of each partner in a marriage as having a built-in "meter" that measures the totality of accumulated negativity in this interaction. As in the case of the point graphs, negativity is reduced or balanced by the positivity expressed or received. To summarize, the P variables measure the total flow and accumulation of overall negativity over time, as the interaction proceeds. I then suggest that there is a *threshold slope* of these cumulated variables such that if the threshold is exceeded, this will affect the "perception" of the interaction.

First, a bit more about the general character of the Q variables. In physics the P variables reflect *kinetic energy* (or flow), and the Q variables reflect *potential energy* (or order). Analogously, I suggest that the Q variables, the equivalent of "potential energy" in my theory, must represent some form of displacement from an equilibrium state of perceived well being. These order or perception variables are the Q variables. In my work, they are operationalized by means of the rating dial and the video recall procedure (see Gottman & Levenson, 1985), as well as by means of techniques such as the talk-table (Gottman, Notarius, Gonso, & Markman, 1976), the communication box (see Floyd & Markman, 1983 ; the Markman & Baccus, 1982 , work with Black couples; and the Ferraro & Markman, 1981 , work with deaf couples), thought listing (Ickes, Robertson, Tooke, & Teng, 1986 ; Ickes, Stinson, Bissonnette, & Garcia, 1990), and the Rushe self-ratings of affective experience when couples are interviewed about specific moments in the interaction (Gaelick, Bodenhausen, & Wyer, 1985).

In my formulation, the Q variables were initially thought of as dichotomous, as either the perception of well-being and safety in the relationship (feeling loved and respected–in which case one can think of $Q = 1$) or the opposite perception. However, as I mentioned earlier in this article, on the basis of work we have done using a video recall interview and the Rushe ratings, this perception of "non-well-being" is made up of either moments of feeling hurt and under attack, that is, perceived threat ($Q = -1$) or moments of hurt and anger (also $Q = -1$). These two responses in Q space are called righteous indignation and innocent victimhood. In the former moment, anger and contempt are central and in the latter fear is central; both kinds of moments are blended with sadness and disappointment. Both kinds of responses in Q space represent distress-maintaining cognitions, and the work of Zillmann (1979) suggested that, once provoked, men are less likely to physiologically soothe themselves than women and more likely to engage in these distress-maintaining cognitions, unless they can retaliate. If these Zillmann gender differences can be generalized to marriages, they pinpoint some important problems.

To explain how to operationalize this theory, I suggest that the Q space represents the "subtext" in a person's perception as the interaction unfolds. Generally, this is a quiescent subtext, as long as $Q = 1$; the perception of neutrality and well-being are subtext that are not very prominent in awareness. When $Q = -1$, perceptions shift and a new cognitive—emotional process is engaged.

Links to Flooding

The first theoretical link I am trying to make is between the behavior process cascade and the distance and isolation cascade. In my formulation, the Q-space value of -1 is the entry point for the flooding variable. Flooding is even more likely if the occupation time in the $Q = -1$ state is long within an

interaction and frequent across interactions and if it is accompanied by chronic or acute diffuse physiological arousal (see Gottman, 1990) or high levels of physiological reactivity. I suggested that flooding is the driving force of the distance and isolation cascade. I am not suggesting that every perception that "all is not OK" leads to flooding, but rather that the negativity needs to exceed some threshold before Q = − 1 and that two factors are critical: One is physiological arousal and the other is the occupation time in this Q = − 1 state; both of these factors will determine whether flooding occurs.

Summary

Figure 3 shows a graph of a P variable and a Q variable. The link between them is the axiom that when the P variable passes a threshold slope, the Q variable shifts. The shift represents a sudden, abrupt change in perception. A parameter in P space (the slope of the cumulated graph) undergoes smooth changes, but at some critical value, the Q variable undergoes a major discontinuity. Thus, I am suggesting that the relationship between P space and Q space is simply a threshold model. When the slope of the cumulated P variable passes a particular threshold, the Q variable jumps from 1 to − 1. This represents a departure from the perception of well-being in the interaction.

Perceptual Shifts and Catastrophe Theory Applied to Cognition

There are two well-known perceptual illusions, one in which a vase can look like two faces, and another in which a young woman can look like an old woman and vice versa. In these examples the perceptual shift is symmetrical. One can go back and forth between seeing the illusion one way or the other. There are, however, other illusions that are less symmetrical: Once they are seen one way, it is very difficult to see them any other way. In the same way, perceptions about an interactional moment, the partner, or the entire relationship may be asymmetrical to varying degrees. For example, a violent act or knowledge of a secret extramarital affair is more likely than most other acts to permanently transform the perception of one's partner. In my formulation, some parameter in P space (the slope of the cumulated curve) changes smoothly, but then at some threshold slope there is an abrupt shift in the perception of well-being (much like the shifts depicted in Figure 3). This is the initial catastrophic change. *Catastrophe* does not mean things are horrible. It means only that one parameter changes continuously (the slope of the cumulated curve in P-space) and the result, after a threshold slope is passed, is a sudden jump discontinuity in Q-space. This relationship is part of the Fivaz (1991 , in press) theory of systems. Catastrophe theory (Arnold, 1986 ; Saunders, 1990) is the study of "abrupt changes arising as a sudden response of a system to a smooth change in external conditions" (Arnold, 1986 , p. 2).

Examples From Interaction in Which Q Space Represents the Subtext

Before going any further with this formulation, let us see how this might work in an actual interaction. The following excerpt of a conversation is taken from a couple discussing the issue of jealousy. The wife's suggested subtext and the suggested value of Q is in parentheses, with commentary.

Husband (H)
Well, the issue is your jealousy. Wife (W)
Which has gotten a lot better lately. (Q = 1; nonverbally she reflects a sense of well being.) H
Yes, it has. Since I made a commitment to my family, it has gotten better. Now, if you saw me during the day driving in my car with a woman, you wouldn't get jealous, probably. W
Why? Is there a woman in your car? (Q = 1; she sounds a bit alarmed, but not very much.) H
No (laughs). W
Good (smiles). (Q = 1. She is relieved.) H
Actually, Laura Neville and I are going to ride together to a workshop. W

A workshop? What about? (Q = 1. She is neutrally asking for information.) H
Commercial real estate. It's business. W
Oh. No, I wouldn't be jealous of that because I know it's purely professional. (Q = 1. She is quite calm.) H
You know it does bother me, though, just for a hypothetical, that, say, I wanted to see Jeannie again, just, say, for lunch, you know. W
No, that's, Jeannie is a different story. You were lovers. (Q = 1. There is a bit of alarm in her voice, but it is slight. Still, she may be drifting to an in-between zone, where there is a higher probability of a shift to Q = − 1.) H
But that was way before I met you. And you know that I have made a commitment to our family. It is just not an issue. It's like seeing an old chum. W
It doesn't matter. That's a very different kind of relationship. She simply has no place in our lives. It's not like a chum. She's a woman. (Q = 1. She accepts this as a hypothetical discussion and is relaxed talking about it, giving her views.) H
See, that's where I think you're wrong. She's a person that I once liked a lot, and it's a shame to lose touch with her. As a friend. As an acquaintance. W
Why should she come into our lives, into our home? Why should my children know her? (Q = − 1. There is suddenly clear alarm in her voice and on her face.) H
She's very interesting, you know. You both went to the same college. You'd have a lot in common. W
Wait a minute! Do you want to see her? Is that what you are saying? (Q = − 1. She looks and sounds fearful.) H
Yes, I would. Why not? I'd like to find out how she's doing, talk to her again. Yes. W
Then I think we have serious problem. We need counseling&pe

Gradually, through these perceptual shifts in Q space, the wife's sense of well-being is displaced by the threat that she feels his desire to seen an old flame is to their relationship. Once the negativity has passed a threshold value Q shifts from 1 to − 1. This is, in rough outline, the way that P and Q spaces can work.

Reformulation of P Space and Q Space in Relation to More Lasting Perceptions and Cognitions About the Marriage

Figure 3 is a summary of the relationship between P space and Q space to flooding and to perceptions of the marriage that are increasingly global and stable. I propose that these more stable and global cognitions about the marriage lead to the distance and isolation cascade and to the recasting of the history of the marriage in negative terms. All of these processes together then make up the story of the trajectory of the couple toward divorce.

The Core Triad of Balance

In Figure 3 , there are three interrelated domains of variables, each of which has the potential for balance. The behavioral P-space variables have positivity and negativity (such as positive and negative emotions) and evidence for balance is presented in Gottman and Levenson (1992) and in Gottman (1993 ; in press) . The perceptual Q-space variables also have potential for balance. This is also true of the physiological variables, and this state of affairs is guaranteed by the anatomy of the nervous system. For example, the sympathetic branch of the autonomic nervous system tends to respond to emergencies by expending energy, whereas the parasympathetic branch often (but not always) plays the restorative, conservative, soothing role. The arrows describing the relationships among elements of the core triad of balance are bidirectional. I propose that programs of soothing and positivity exist and can be activated from any element of the triad (e.g., thoughts, behavior, or physiological response). Similarly, on the negative side, I propose that programs of alarm and negativity exist and can be activated from any

element of the triad (e.g., thoughts, behavior, or physiological response). In most marriages, interaction involves a dynamic set of movements around set points in all three elements of the core triad of balance. There are, in effect, three weakly related thermostats, each of which can undergo catasrophic shifts as a function of set point thresholds being exceeded. In marriages that are ailing, not only is this balance upset, but also the linkage between them becomes tighter. For example, when a P-space variable's slope exceeds a critical threshold, the core triad combine to determine global and stable negative distress-maintaining cognitions that lead to flooding and, thence, to the distance and isolation cascade.

Therapeutic Implications of the Theory: Minimal Marital Therapy

One must bear in mind that not all couples should remain married and that helping a couple to decide to divorce is a perfectly valid function of marital therapy. However, what if the couple and the therapist all decide to try to change the marriage and make it work as a stable adaptation? Who knows what might result? Unfortunately, these results are quite premature with regard to the current state of knowledge of how well intervention programs function in preventing marital dissolution. Definitive research still needs to be conducted. However, the meager results to date are encouraging. Gottman (1979, p. 271) reported the results of a small sample-size study in which the 2-year divorce rate was 50% in the control group but 0% in the experimental group. Subjects in the experimental group received training by paraprofessional staff (they were not trained as therapists) who used only the *Couple's Guide to Communication* (Gottman et al., 1976). Jacobson, Schmaling, and Holtzworth-Munroe (1987) reported the 2-year follow-up results of behavioral marital therapy. There were three treatment groups, the behavior exchange group (BE), the communication problem-solving group (CPT), and the complete (CO) treatment group. After 2 years, the percentages of couples who separated or divorced were 55% in the BE treatment, 36% in the CPT treatment, and 9% in the CO treatment. Despite the small sample size, the CO couples were reported as significantly less likely to have separated or divorced than either BE or CPT couples ($p < .05$). Jacobson et al. wrote, "Thus, there was much to indicate that treatment gains in the CO condition were holding up relatively well. In contrast, there was little indication of enduring changes in the two component treatment conditions" (p. 192). Hence, there is some evidence that a detailed and complete treatment of the kind spelled out in Jacobson's et al.'s program or in the *Couple's Guide* may be helpful, in the short run, in preventing marital dissolution. Markman et al. (1988) presented the 1.5-year and 3-year results of his Premarital Relationship Enhancement Program. Each of five sessions lasted approximately 3 hr. They wrote, "Each session was devoted to one or two major content areas, and homework assignments were completed between sessions that required couples to practice skills, read chapters, and complete exercises in *A Couple's Guide to Communication* (Gottman et al. 1976)." (p. 212). For purposes of analysis of the effects of the intervention on relationship stability, Markman et al. combined those who were married or planning marriage into the stable group and those who had broken up before marriage, divorced, or separated into the unstable group. Their results on relationship stability were as follows:

At Follow-up 1, results showed that no couple from the intervention group had dissolved their relationship, whereas 4 couples from the control group (19%) had done so. At Follow-up 2, 1 couple from the intervention group (5%) and 5 couples from the control group (24%) had dissolved their relationships. Chi-square tests indicated that the dissolution rate of intervention couples was lower than that of control couples at both Follow-up 1, chi-square $(1, N = 42) = 10.4$, $p < .001$, and Follow-up 2, chi-square $(1, N = 42) = 6.8$, $p < .01$. (p. 213).

There were problems with the Markman et al. experimental design, as couples were able to refuse treatment, which resulted in a nonrandom subject selection effect in the experimental group; it also resulted in relatively low power to detect treatment effects. One must be cautious about these results as the researchers considered couples who dissolved their relationships before marriage as equivalent to couples who separated or divorced after marriage. However, there is some evidence of continuity. A

more recent study (Markman, Renick, Floyd, Stanley, & Clements, 1993) reported the results of a 4- and a 5-year follow-up. In these analyses, separations and divorces that occurred only after marriage were examined. At the 5-year follow-up, two control couples (8.3%) had separated or divorced, whereas five control couples (16.1%) had separated or divorced; these differences were not statistically significant, but there is very low power to detect differences of this magnitude with such small sample sizes. The results are in the right direction: couples in the control group separated or divorced at nearly twice the rate of the couples in the experimental group.

McCrady, Stout, Noel, Abrams, and Nelson (1991) treated 45 alcoholics and their spouses in one of three conditions, one of which was alcohol-focused spouse involvement and behavioral marital therapy (reciprocity enhancement and problem-solving skills training). The percentage of separations in this group was 11.1%, compared with 36.45% and 28.6% in the other two groups (which had no marital therapy); the authors also noted that the separations in the combined group were "quite short" (p. 1420).

The theoretical formulation I have presented here suggests several possible entry points for a therapeutic intervention, including the core triad of balance as well as flooding. However, some thought and experience will suggest that finding an entry point for the therapy is not so easy because one often confronts ingrained patterns of emotional conditioning and nondisconfirmable hypotheses about what is wrong. In Gottman (in press-b, chapter 16) , I make an argument for a new form of therapy that I call *minimal marital therapy.* This therapy has only three components: (a) Nondefensive and nonprovocative speaking (particularly in the presentation of complaints), (b) nondefensive listening and validation, and (c) editing. Furthermore, I propose that these three components be *overlearned* and be accompanied by *physiological soothing.* This suggestion of a minimal marital therapy that is overlearned is not intended as a complete therapy but as an entry point for interrupting negative affect reciprocity. The analysis presented in Gottman (in press) concluded that negative affect reciprocity is the most consistent discriminator across studies between happily and unhappily married couples because the negative absorbing chain implies that the distressed couple's normal repertoire of repair mechanisms is not functional. Repair mechanisms are often delivered with negative affect (e.g., "Stop interrupting me!"). Distressed couples tend to attend and respond only to the negative affect component, whereas nondistressed couples tend to respond to the repair component and edit their response to the negative affect component (see Gottman, 1979 , and Gottman et al., 1976 , on editing as a skill). The reasoning is that if the negative affect reciprocity is weakened, the couple will typically have access to a wide range of repair mechanisms that may now work. Across studies there may be inconsistency in discriminating happily from unhappily married couples in specific interaction skills because there is wide variation in the skill repertoire of couples. Each therapist will have to make an assessment of each couple to determine which skills and repair mechanisms the couple has access to once negative affect reciprocity is broken. Physiological soothing implies that couples take breaks if their base-line heart rates are greater than or equal to 10 beats per minute higher than resting levels (upon rising from restful sleep) or if their heart rates during the discussion become elevated by 10 beats per minute or more. It is important that, during that break, distress-maintaining cognitions not be rehearsed and that self-soothing activities and cognitions be present. On the basis of principles of escape conditioning, it would be ideal if partners could learn to soothe each other, but this is a lot to expect.

The emphasis on overlearning the three components needs to be briefly explained. Gottman (1990) argued that diffuse physiological arousal reduces one's ability to process information and creates a reliance on overlearned behaviors and cognitions. Usually these are fight-or-flight responses (or both). By overlearning the three skills, one makes it more likely that they will be accessible to the couple's repertoire as they begin becoming upset and physiologically aroused. Overlearning is the natural process that makes a skill automatic with repeated use. Only through overlearning can this occur, and couples need access to these skills most when they are usually least likely to have this access because of diffuse physiological arousal. Several caveats are in order. Although there are empirical data to support some

parts of the theory, the theory presented in this article is highly speculative. First, it must be admitted that all the models proposed are based on correlational, albeit longitudinal, data. True experiments are quite difficult to conduct in this area; even in therapy studies it is often less than clear what precisely the independent variables really were. Nonetheless, true experiments are required. Also, the results are based on only a few studies, and they are all short-term longitudinal studies. Replication is essential, and it is currently underway in my laboratory. Also, the most exciting part of the data–the synchronization of behavior, perception, and physiology within an interaction–has yet to be explored. This too is currently underway. In favor of the theory is its potential for generating new research. Also, in the area of divorce prediction, it is as important to have data that fit together into a relatively simple theory as it is to have some data that can predict marital dissolution.

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Figure 1. The cascade toward marital dissolution, which suggests a trajectory useful for short-term longitudinal studies of divorce prediction: (a) Study 1's structural model and (b) Study 2's structural model.
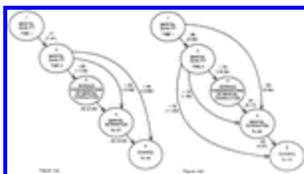
Figure 2. (a) Structural models with the Marital Interaction Coding System (MICS) and the Rapid Couples Interaction Scoring System (RCISS) show that there is a process cascade related to the prediction of dissolution, the four horsemen of the Apocalypse, and (b) structural model showing that there is a perceptual cascade related to the prediction of dissolution, the distance and isolation cascade.
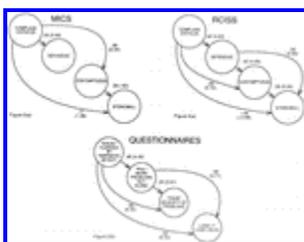

Figure 3. The application of Fivaz's (1991 , in press) theory to marital interaction. (P-space represents variables indexing the cumulation over time of positivity minus negativity; Q-space represents the

subjective experience of the interaction [values of Q = 1 represent well-being, whereas values of Q = − 1 represent a negative state]. Note that Q-space is differentiated at its value of Q = − 1 into righteous indignation or innocent victimhood. The core triad of balance [behavior flow, perception, and physiology] is shown, with bidirectional relationships. These determine flooding, which leads to the distance and isolation cascade. DPA = diffuse physiological arousal.)