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Can People Feel Happy and Sad at the Same Time?

Jeff T. Larsen
Department of Psychology, The Ohio State University;
A. Peter McGraw
Department of Psychology, The Ohio State University;
John T. Cacioppo
Department of Psychology, University of Chicago

ABSTRACT

The authors investigated whether people can feel happy and sad at the same time. J. A. Russell and J. M. Carroll's (1999) circumplex model holds that happiness and sadness are polar opposites and, thus, mutually exclusive. In contrast, the evaluative space model (J. T. Cacioppo & G. G. Berntson, 1994) proposes that positive and negative affect are separable and that mixed feelings of happiness and sadness can co-occur. The authors both replicated and extended past research by showing that whereas most participants surveyed in typical situations felt either happy or sad, many participants surveyed immediately after watching the film *Life Is Beautiful* , moving out of their dormitories, or graduating from college felt both happy and sad. Results suggest that although affective experience may typically be bipolar, the underlying processes, and occasionally the resulting experience of emotion, are better characterized as bivariate.

Just as black is the opposite of white, happiness seems to be the opposite of sadness. The two emotions differ in almost every respect. Those who are satisfied with their current state typically feel happy; those who are dissatisfied feel sad (Russell & Carroll, 1999). Those who get what they want feel happy; those who do not feel sad (Shaver, Schwartz, Kirson, & O'Connor, 1987). When people are happy they generally smile, laugh, and seek out others; when they are sad they frown, cry, and withdraw from others (Shaver et al., 1987). Given such sharp contrasts between happiness and sadness, models of affect typically conceptualize the two emotions as diametric opposites (e.g., R. J. Larsen & Diener, 1992 ; Russell, 1980 ; Russell & Carroll, 1999 ; Watson & Tellegen, 1985 , 1999). Nevertheless, theorists disagree over the relationship between happiness and sadness in experience and, in particular, over whether happiness and sadness can be experienced simultaneously.

Circumplex Models

Russell (1980) has developed a bipolar model of affect within the context of a more general circumplex model of affect. The circumplex model posits that emotions fall in a circular order around the perimeter of the space defined by a bipolar valence dimension and an orthogonal dimension labeled *activation* (see Figure 1). Using multidimensional scaling of similarity ratings, Russell and other researchers have recovered the circumplex from similarity judgments of emotion-related words in several cultures around the world (e.g., Almagor & Ben-Porath, 1989 ; Russell, 1983) and from children's similarity judgments of facial expressions (Russell & Bullock, 1985). Happiness and sadness consistently fall near the poles of the bipolar valence dimension, suggesting that people treat happiness as the diametric opposite of sadness, in particular, and negative emotions as the opposite of positive emotions, in general.

The circumplex was intended to capture not only the relative similarity of words people use to describe emotion but also the structure of emotion as it is experienced, or what Russell and Feldman Barrett (1999) have termed *core affect* . Core affect, as defined by Russell and Feldman Barrett, refers to the "most elementary consciously accessible affective feelings" that people experience (p. 806). At any moment in time, individuals' affective state is assumed to fall at a single discrete point within the circumplex. Moreover, the extent to which a pair of emotions is experienced together is thought to depend on how near to each other they lie in the space. Whereas pairs of emotions separated by only a few degrees are assumed to be positively correlated and those separated by 90° are assumed to be uncorrelated, pairs of emotions separated by roughly 180° (e.g., happiness and sadness) are assumed to be negatively correlated. To test the model's predictions regarding the experience of emotion, Russell (1980) also had participants indicate the extent to which various emotion terms described the participants' own current emotional state. Principal-components analyses revealed a circumplex structure remarkably similar to that obtained for similarity ratings. *Happy* and *sad* again emerged as polar opposites, implying a negative correlation between the experience of the two emotions. Remington, Fabrigar, and Visser (2000) recently fit the data from several published studies to the circumplex stochastic process model with a Fourier series, which Browne (1992) specifically developed to assess circumplex structure. Consistent with Russell's initial findings, Remington et al. found that the angle between happy and sad is typically estimated to be approximately 170°.

Despite its considerable support, Russell and Carroll (1999) recently refined the circumplex model's treatment of polar opposite emotions. Following the typical assumption that items at opposite ends of a bipolar continuum should have a perfectly negative theoretic correlation, the circumplex model originally predicted a theoretic correlation between happiness and sadness, and between other polar opposites, approaching —1. However, Russell and Carroll explained that rather than being perfectly negatively correlated, two items defined as polar opposites of some underlying bipolar continuum should instead be mutually exclusive. According to Russell and Carroll, "bipolarity says that when you are happy, you are not sad and that when you are sad, you are not happy" (p. 25). That is, any degree of happiness is assumed to preclude sadness, and, conversely, any degree of sadness is assumed to preclude happiness. Whereas a perfect negative correlation implies a linear relationship, mutual exclusivity implies an L-shaped function and therefore yields a negative correlation considerably weaker than —1.

Russell and Carroll's (1999) model appears to be inconsistent with the findings of Diener and Iran-Nejad (1986) , who had participants complete emotion ratings during emotional moments in their lives for a period of 6 weeks. Though Diener and Iran-Nejad did find that positive and negative emotions were mutually exclusive at high levels, they also found that positive and negative emotions often co-occurred at moderate levels. Though these findings may suggest that people can feel happy and sad at the same time, Russell and Carroll's model provides two alternative interpretations. First, Diener and Iran-Nejad's intent was to measure positive and negative emotions in general rather than happiness and sadness in particular. Their measures of emotion therefore consisted of summed ratings of several positive (e.g., *happy* , *joyful* , *fun/enjoyment*) and negative emotions (e.g., *depressed* / *blue* , *unhappy* , *angry* / *hostile*) that varied in activation. According to Russell and Carroll's model, the inclusion of emotions distant from the bipolar valence dimension likely increased reports of the co-occurrence of positive and negative emotions, and, therefore, these data do not directly address whether people felt both happy and sad at the same time.

In addition, Russell and Carroll's (1999) model can attribute Diener and Iran-Nejad's (1986) frequent reports of simultaneous positive and negative emotions to ambiguous response formats. Diener and Iran-Nejad as well as Russell (1980 ; Feldman Barrett & Russell, 1998) and other emotion researchers (e.g., Green, Goldman, & Salovey, 1993 ; Watson, Clark, & Tellegen, 1988 ; Watson & Tellegen, 1999) have often measured emotion with unipolar scales on which participants rate the extent to which they are experiencing various emotions on scales ranging from, for example, *not at all* to *extremely* . Russell and

Carroll (1999) , however, cautioned that participants might treat these apparently unipolar measures as bipolar measures instead. Supporting evidence comes from a study in which Carroll and Russell (1998; cited in Russell & Carroll, 1999) had participants supply labels for the 5 unlabeled points on a 7-point scale anchored by *not happy* and *happy* . All participants applied negative emotions (e.g., sad, bad) to the lowest unlabeled point, and most thought that neutral was located near the middle of the scale rather than the lower end.

One implication of these findings is that even if happiness and sadness are mutually exclusive, participants are likely to endorse feeling both happy and sad when the response format is ambiguous. Carroll and Russell (1998, cited in Russell & Carroll, 1999) provided evidence for this point with a second study. To identify an unambiguously unipolar measure of emotion, they had participants rate their emotional state with several different response formats. A substantial proportion of participants endorsed feeling happy and sad on conventional unipolar measures, but measures developed by Carroll and Russell yielded a different pattern of results. To measure happiness, Carroll and Russell first asked participants whether they felt happy. Only those who checked *yes* were then asked to indicate how happy they felt on a unipolar scale ranging from *slightly* to *extremely* . Analogous measures were used to measure sadness and other emotions. In contrast to their findings with conventional unipolar measures, Carroll and Russell found that few of their participants (11%) endorsed feeling both happy and sad with these measures. Carroll and Russell's findings suggest that their emotion rating scales approximate a strictly unipolar response format and provide evidence consistent with the updated circumplex model. Moreover, they render more testable the hypothesis that happiness and sadness are mutually exclusive.

The Watson and Tellegen (1985) Model

A model similar to Russell's (1980 ; Russell & Carroll, 1999) circumplex model has been articulated by Watson and Tellegen (1985) . Like Russell's model, Watson and Tellegen's model features a circular ordering of emotion terms described by two nearly orthogonal dimensions. The models are also in general agreement on the position of the various emotion terms around the perimeter of the circle. Following Russell, for example, Watson and Tellegen described a bipolar valence dimension (i.e., pleasantness versus unpleasantness) that features *happy* and *sad* as negatively correlated polar opposites (e.g., Watson & Tellegen, 1999 , p. 606). The models are distinct in that Watson and Tellegen rotated the axes 45° and highlighted two orthogonal dimensions, termed Positive Activation and Negative Activation (Watson & Tellegen, 1985 ; cf. positive and negative affect, Watson, Wiese, Vaidya, & Tellegen, 1999). [1]

The common finding that Positive and Negative Activation, as measured by the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988), are only weakly correlated has been taken as evidence against Russell's (1980 ; Russell & Carroll, 1999) position that the valence dimension is bipolar (e.g., Zautra, Potter, & Reich, 1997). As Watson and Tellegen (1999 ; Watson et al., 1999) have noted, however, Positive and Negative Activation are not meant to represent the positive and negative ends of Russell's valence dimension (see also R. J. Larsen & Diener, 1992 ; Russell & Carroll, 1999). Rather, Positive and Negative Activation explicitly entail highly activated positive emotions (e.g., excitement) and highly activated negative emotions (e.g., distress) rather than moderately activated emotions such as happiness and sadness. Low correlations between Positive and Negative Activation are therefore not inconsistent with the circumplex model and do not provide evidence against the bipolarity of the valence dimension.

Similarly, findings that mood manipulations can have selective effects on the PANAS subscales may also be seen as evidence against bipolarity of positive and negative affect. R. J. Larsen and Ketelaar (1991) found, for example, that positive mood inductions (e.g., having participants imagine they had

won the lottery) increased Positive Activation but had no effect on Negative Activation (see also, Rusting & Larsen, 1997). Russell and Feldman Barrett (1999) noted, however, that independent effects on Positive Activation and Negative Activation can be attributable to the operation of a single bipolar valence mechanism. For example, an increase in Positive Activation coupled with no change in Negative Activation can be due to an increase in positive affect coupled with an increase in activation.

The Evaluative Space Model

Whereas circumplex models focus on the experience of affect, Cacioppo and Berntson's (1994) evaluative space model (ESM) focuses on the underlying processes that give rise to the experience of affect. Though the ESM emerged in the domain of attitudes (Cacioppo & Berntson, 1994 ; Cacioppo, Gardner, & Berntson, 1997), it has since been developed into a general model of affect and emotion (Cacioppo, Gardner, & Berntson, 1999). According to the ESM, the experience of valence represents the integration of two separable and partially distinct components of the affect system, one attuned to nurturance and appetition (i.e., positivity), and the other attuned to threat and aversion (i.e., negativity; see Figure 2).

By conceptualizing the affect system within a bivariate space rather than a bipolar continuum, the ESM allows for several modes of evaluative activation, each possessing distinct antecedents, processing properties, and consequences (Cacioppo & Berntson, 1994 , Table 1). Like other models of affect, the ESM holds that positivity and negativity have antagonistic effects: Positivity fosters approach; negativity fosters avoidance. This does not imply, however, that positivity and negativity must be reciprocally activated. Though positivity and negativity may often be characterized by reciprocal activation, they may also be characterized by uncoupled activation, coactivation, or coinhibition. Uncoupled activation occurs when changes in one system are not accompanied by changes in the other. Coactivation and coinhibition occur when changes in one system are associated with parallel or opposite changes in the other system, respectively.

Though the ESM and Watson and Tellegen's (1985) model may appear similar, the two models are quite distinct (Cacioppo et al., 1999 ; Russell & Feldman Barrett, 1999). Following Thurstone (1931) , the ESM defines affect as feeling for or against something and makes no reference to activation. From the ESM's perspective, positive and negative affect include not only highly activated positive and negative emotions but also happiness, sadness, and other, more prototypic positive and negative emotions. One implication is that the ESM's conceptualizations of positive and negative affect relate less clearly to Watson and Tellegen's Positive and Negative Activation dimensions than to their bipolar pleasantness versus unpleasantness dimension. Thus, although a central tenet of Watson and Tellegen's model is that Positive and Negative Activation are largely independent, in comparing their model with the ESM, it is more relevant that Watson and Tellegen assumed that pleasantness and unpleasantness (i.e., positive and negative affect) are negatively correlated. The ESM agrees that positive and negative affect are often negatively correlated but also contends that they can be uncorrelated or even positively correlated. If the affect system evolved to guide behavior, however, we would expect coactivation to be unpleasant, unstable, and often short-lived. Thus, the ESM posits that coactivation can occur but that affective processes typically gravitate toward bipolarity over time (Cacioppo & Berntson, 1994).

Evidence for Separability of Positive and Negative Affect

Consistent with the hypothesis that the experience of positive and negative affect can be separable, evidence from the neurosciences suggests that the neural processes involved in positive and negative affect are partially distinct. Davidson (1998) , for example, has reviewed evidence that the two hemispheres of the cortex are differentially involved in affective processing, with the left frontal cortex

involved in approach-related emotional behaviors and the right frontal cortex involved in withdrawal-related emotional behaviors. Specific neural structures also appear to be differentially involved in positive and negative affect. The amygdala, for example, has often been implicated in negative affect. In the rat, the amygdala is involved in fear conditioning (LeDoux, 1995). In humans, unpleasant pictures appear to elicit amygdalar activation (Irwin et al., 1996), and stimulation of the amygdala can evoke aversive reactions (Halgren, 1982). In contrast to the role of the amygdala in negative affect, the mesolimbic dopaminergic pathway projecting from the ventral tegmental area of the midbrain to the nucleus accumbens has been implicated in positive affect (Hoebel, Rada, Mark, & Pothos, 1999). In the rat, natural rewards activate dopaminergic release, which appears to contribute to reward. Dopamine agonists (e.g., amphetamine, cocaine) can induce euphoria and enhance natural rewards in humans, whereas dopamine antagonists can attenuate reward (Wise, 1996).

Evidence that neural processes involved in positive and negative affect are partially distinct raises the possibility that these systems can be coactivated (Cacioppo & Berntson, 1994). Psychobiological evidence comes from the taste system, which governs affective and behavioral reactions to food. For example, the sweet taste of sucrose selectively potentiates intake, and the bitter taste of quinine potentiates rejection. Berridge and Grill (1984) reported that a combined solution of sucrose and quinine triggered the reflexes associated with both responses, producing vigorous, opposing appetitive and aversive orofacial patterns in rapid alternation. Berridge and Grill's study is conceptually similar to classic research on conflict theory by Miller (1959) , who placed rats in runways containing both the promise of reward (i.e., food) and the threat of punishment (i.e., shock). Though rats ultimately approached or avoided the cues, they initially vacillated, suggesting coactivation of positive and negative affect.

Research on attitudinal ambivalence extends psychobiological and behavioral evidence by demonstrating that coactivation of positive and negative affect can also be subjectively experienced and reported. Many respondents report feeling both good and bad toward legalized abortion, affirmative action, and other attitude objects (e.g., Priester & Petty, 1996). The validity of such reports of conflicting positive and negative feelings is reflected in reliable correlations with ratings of tension, indecision, and other measures of subjective ambivalence (Priester & Petty, 1996 ; Thompson, Zanna, & Griffin, 1995).

Potential Implications for the Experience of Affect

To summarize thus far, disparate lines of research focusing on neural activity (e.g., LeDoux, 1995) and subjective experience (e.g., Priester & Petty, 1996) provide convergent evidence that it can be useful to characterize evaluative reactions in terms of a bivariate space. Although these literatures are more easily accommodated by the ESM than by bipolar models of affect, Russell and Feldman Barrett (1999) drew a distinction between evaluative reactions to stimuli (e.g., rats' vacillation in a runway, people's feelings toward affirmative action) and one's emotional state as distinct classes of affect. They acknowledged that evaluative reactions can be seen as bivariate but maintained that happiness and sadness are mutually exclusive. Though we agree that evaluative reactions and emotions are distinct, we do not draw such sharp divisions between classes of affect. As mentioned above, the ESM broadly defines affect as feelings for and/or against some referent, whether that referent is a discrete stimulus (e.g., an attitude object) or one's own current emotional state. Thus, by positing that positive and negative affect are separable, the ESM holds out the possibility that people can experience mixed feelings of happiness and sadness at the same time. Because the ESM also assumes that bipolarity is more harmonious and stable than is coactivation (Cacioppo et al., 1997), we do agree with Russell and Carroll (1999) that individuals typically feel either happy or sad a great deal of the time. To investigate whether individuals can ever feel both happy and sad, we therefore found it necessary to seek out more emotionally complex situations.

In three studies we used Carroll and Russell's (1998; cited in Russell & Carroll, 1999) strictly unipolar measures of emotion to examine the co-occurrence of happiness and sadness. In Study 1, we examined whether people were more likely to experience mixed feelings of happiness and sadness after, as opposed to before, watching the film *Life Is Beautiful* . Subsequent studies investigated emotional coactivation (i.e., mixed feelings) in more ecologically valid situations. Specifically, we examined whether undergraduates were more likely to feel both happy and sad on the day that they moved out of their college dormitory (Study 2) and on their graduation day (Study 3) than on more typical days.

Study 1: *Life Is Beautiful*

The 1997 film *Life Is Beautiful* depicts a father's often-comic attempts to keep his son alive and unaware of their plight during their detention in a World War II concentration camp. This unlikely comedy, at once humorous and tragic, seems to provide an ideal initial test of the hypothesis that people can feel both happy and sad at the same time. Specifically, we hypothesized that individuals would be more likely to feel both happy and sad after rather than before watching *Life Is Beautiful* .

Method

Participants completed a 10-item emotion survey in March 1999 as they entered a Columbus, Ohio, theater to see *Life Is Beautiful* or as they left the theater. Oral and written instructions asked participants to indicate how they felt "right now, at this very moment." Participants were then presented with 10 questions intended to measure their current emotional state. Items consisted of five pairs of emotion terms chosen to lay roughly 180° from one another on the affective circumplex. The five pairs were *calm — tense* , *relaxed — stressed* , *happy — sad* , *pleased — displeased* , and *excited — depressed* . In this and all studies, the questions were of the form, "Do you feel happy? ____ Yes ____ No. If you checked yes, how happy are you?" The scale ranged from 1 to 5. The numbers 1, 3, and 5 were labeled *slightly* , *moderately* , and *extremely* . Following Russell and Carroll (1999) , the initial dichotomous (i.e., *yes* / *no*) query was intended to discourage participants from treating the unipolar measures as bipolar measures of the given emotion (e.g., happiness) and its opposite (e.g., sadness). Those who reported not feeling a given emotion were assigned a 0. Two forms of the questionnaire were developed. We constructed one form by randomizing the 10 terms, with the constraint that opposite items were separated by at least two other items, and we constructed the other form by reversing the order of the items. After completing the 10 emotion items, participants indicated their age and gender.

The survey was completed by 189 people. Data from 12 participants who failed to follow instructions or left emotion items blank were removed. All analyses were conducted on the remaining 177 participants (93 women, 69 men, 15 unreported), who ranged in age from 18 to 80 years ($M = 34.2$). Of these, 70 and 107 participants completed the survey before and after the film, respectively.

Results and Discussion

Emotion ratings before and after the film are shown in Table 1 . Ratings from each emotion were submitted to a 2 (situation: before film, after film) × 2 (form: A, B) ANOVA. These analyses revealed that participants generally felt stronger negative and weaker positive emotions after the film than before. Specifically, participants felt more sad, displeased, and depressed after the film and less happy, relaxed, and excited. [2]

Of greater theoretical relevance were the relationships among the emotions, particularly polar opposite emotions (e.g., *happy—sad*). The circumplex model expects most participants to endorse no more than one item in each pair of polar opposite emotions but allows for a few individuals to endorse both

emotions because of systematic error (e.g., acquiescence) and unsystematic error (e.g., inattention). The relative frequency of participants experiencing the various combinations of happiness and sadness before and after watching *Life Is Beautiful* is shown in the left and right panels of Figure 3 , respectively. Light bars denote participants who felt happy, sad, or neither emotion; dark bars denote participants who felt both happy and sad. Whereas only 10% of participants felt both happy and sad before the film, 44% felt both happy and sad after the film, $\chi^2 (1, N = 177) = 22.97, p < .05$. [3] These data are difficult to reconcile with the circumplex model, which assumes that happiness and sadness are mutually exclusive. However, they are consistent with the evaluative space model, which assumes that happiness and sadness are unlikely to co-occur in typical situations (e.g., before seeing *Life Is Beautiful*) but may co-occur in emotionally complex situations (e.g., after seeing *Life Is Beautiful*).

One alternative explanation is that participants were simply more acquiescent after the film. In addition to attenuating the negative correlation between measures of positive and negative affect (Green et al., 1993), acquiescence could have inflated the proportion of people who endorsed feeling both happy and sad after the film. Another possibility is that those who participated after the film were more likely to endorse items randomly, which again would cause inflated reports of happiness and sadness. Data from the remaining pairs of polar opposites allow us to address these alternative explanations. Both acquiescence and random responding would lead participants to be more likely after the film to endorse all of the polar opposite emotions (e.g., *calm—tense*), not just happiness and sadness. As Table 2 shows, however, participants were only more likely to report feeling both happy and sad. Thus, differential acquiescence and random responding cannot account for our findings.

Although *pleased* and *displeased* lie within several degrees of happiness and sadness, respectively, on the circumplex, the *pleased—displeased* results differed from the *happy—sad* results. Specifically, few participants felt both pleased and displeased before or after the film. We included the *pleased* and *displeased* items to replicate Russell's early studies (e.g., Russell, 1980), but more recent studies by Russell (e.g., Feldman Barrett & Russell, 1998), Watson and Tellegen (1985) , and others have not included *displeased* as an index of unpleasant affect. This suggests that people may not view *displeased* as a relevant descriptor of their emotional state. Supportive evidence comes from Remington et al.'s (2000) recent review, in which *displeased* was not among the 71 emotion words commonly used in investigations of the circumplex. A related possibility is that rather than using these terms to report their emotional state, participants may have used *pleased* and *displeased* to report their evaluation of the film.

Study 2: Move-Out Day

Study 1 demonstrates that people can feel happy and sad at the same time during a powerful and emotionally complex film. In Study 2 we examine whether our findings generalize to a more ecologically valid situation. We suspected that moving out of the dormitories may signify the beginning of a fun and relaxing summer vacation but also the end of the good times and friendships associated with dormitory life. To that end, we hypothesized that undergraduates would more likely feel both happy and sad upon moving out of their dormitories in June than on a more typical day.

Study 2 has a second purpose. In the attitudes domain, Priester and Petty (1996) have distinguished between objective and subjective ambivalence. Objective ambivalence refers to the co-occurrence of positive and negative feelings about an attitude object. Subjective ambivalence refers to the feelings of conflict and indecision that presumably result from objective ambivalence. When we apply Priester and Petty's framework to the experience of emotion, Study 1 provides evidence of objective emotional coactivation (i.e., mixed feelings). In Study 2, we examine the subjective experience of emotional coactivation as well. Whereas Priester and Petty (1996) used ratings of conflict, for example, to index subjective ambivalence, emotional coactivation refers more to current emotions than to future decisions

or behavior. Rather than using Priester and Petty's measures, we therefore attempted to index the subjective experience of emotional coactivation by asking participants whether they felt bittersweet.

Method

Ohio State University (OSU) freshmen completed a nine-item emotion survey as they turned in the key to their dormitories in June 1999 or during a more typical day in November 1999. The surveys were identical to those used in Study 1, with four exceptions. First, the terms *pleased* and *displeased* were removed because it was not clear in Study 1 that participants used these items to report their emotions. Second, the *bittersweet* item was included in an attempt to measure the subjective experience of emotional coactivation. Third, participants rated their emotions on a scale of 1—7 rather than 1—5 so that we could obtain more detailed emotion ratings. Fourth, so that we could control for order effects more systematically, we constructed eight forms such that polar opposites were separated by at least two items, the order of *happy* and *sad* and the order of *calm* and *tense* were counterbalanced, and *bittersweet* either preceded or followed the remaining items.

The survey was completed by 200 OSU undergraduates. Data from 8 participants who failed to follow instructions or left items blank were removed. All analyses were conducted on the remaining 192 participants, 100 of whom completed the survey on move-out day, and 92 of whom completed the survey on a typical day.

Results and Discussion

Emotion ratings on a typical day and on move-out day are shown in Table 3 . Ratings from each emotion were submitted to a 2 (situation: typical day, move-out day) × 2 (order of *happy* item: before vs. after *sad* item) × 2 (order of *calm* item: before vs. after *tense* item) × 2 (order of *bittersweet* item: before vs. after other emotions). The ANOVAs revealed that participants who had just moved out of their dormitories felt significantly more sad but also more excited. They were also less stressed and tense, suggesting that the strain of moving out of the dormitories in June is less intense than that of midterms and papers in November. [4]

To replicate the central findings of Study 1, we examined participants' endorsement of polar opposite emotions. The relative frequency with which participants experienced the various combinations of happiness and sadness on a typical day and on move-out day is shown in the left and right panels of Figure 4 , respectively. Whereas only 16% of the participants felt both happy and sad on a typical day, 54% felt both happy and sad on move-out day, χ^2 (1, N = 192) = 29.57, $p < .05$. These results extend Study 1 by showing that happiness and sadness can co-occur not only after one watches the film *Life Is Beautiful* but in more ecologically valid situations as well. [5]

As in Study 1, results from the other pairs of polar opposite emotions rule out the possibility that participants were more likely to endorse being happy and sad on move-out day, as opposed to on a typical day, because of greater acquiescence or random responding. As Table 4 shows, participants who completed the survey on move-out day were not more likely to endorse both members of the other three pairs of opposite emotion terms (e.g., *calm—tense*). In fact, Table 4 reveals that participants were more likely to endorse feeling both relaxed and stressed on a typical day than on move-out day. Though we did not anticipate this finding, it does underscore the point that the experience of emotion is less likely to conform to the circumplex as participants are surveyed farther from the rarified settings in which studies of emotion are often conducted.

The *bittersweet* item was intended to index the subjective experience of emotional coactivation. Given

that participants who completed the survey on move-out day were more likely to feel both happy and sad than were participants who completed it on a typical day, we expected them to feel more bittersweet as well. Nevertheless, *bittersweet* ratings were uniformly low on move-out day and on a typical day (see Table 3). There are several possible reasons for this null finding. One possibility, of course, is that people felt no greater mixed feelings on move-out day than on a typical day. Another possibility is that bittersweet feelings do not provide an index of subjective emotional coactivation. A third possibility, which we consider later, is that OSU freshmen simply tend to be unfamiliar with the term *bittersweet* .

Study 3: Graduation Day

The first goal of Study 3 is to provide a third test of whether people can feel happy and sad at the same time. We suspected that graduation would signify for college students the end of both the pleasant and the unpleasant times associated with college and that it would make especially salient their hopes and fears regarding the future. To that end, we hypothesized that University of Chicago undergraduates would more likely feel both happy and sad on their graduation day than on a typical day. We again attempted to index subjective emotional coactivation with the *bittersweet* item. In addition, we added another potential measure of subjective emotional coactivation by simply asking people whether they felt *ambivalent.*

Method

University of Chicago undergraduates completed a 10-item emotion survey as they turned in their caps and gowns after graduating in June 2000 or during a typical day in July 2000. The surveys were identical to those used in Study 2, with three exceptions. First, we included an item that asked individuals whether they felt ambivalent. Second, we counterbalanced the order of the *bittersweet* and *ambivalent* items. This pair of items either preceded or followed the remaining emotion items. Third, to avoid doubling the number of forms to 16, we held constant the order of *calm* and *tense* . [6]

The survey was completed by 124 University of Chicago undergraduates. Data from 9 participants who failed to follow instructions or left items blank were removed. All analyses were conducted on the remaining 115 participants (53 women, 57 men, 5 unreported). These participants ranged in age from 18 to 30 years ($M = 21.2$); 66 of them completed the survey on graduation day, and 49 of them completed it on a typical day. On graduation day, the surveys were administered between 5 and 120 min after the end of the graduation ceremony ($M = 67$ min, $SD = 28$ min).

Results and Discussion

Emotion ratings among nongraduates and graduates are shown in Table 5 . Ratings from each emotion were submitted to a 2 (situation: typical day, graduation day) × 2 (order of *happy* item: before vs. after *sad* item) × 2 (order of subjective emotional coactivation items: before vs. after other emotions) × 2 (order of *bittersweet* item: before vs. after *ambivalence* item). Unlike in the previous studies, these ANOVAs revealed that graduates felt both greater sadness and greater happiness than nongraduates. Graduates were also more excited and less calm.

To replicate the central findings of Studies 1 and 2, we examined participants' endorsement of polar opposite emotions. The relative frequency of participants experiencing the various combinations of happiness and sadness on a typical day and on graduation day is shown in the left and right panels of Figure 5 , respectively. Whereas only 20% of participants felt both happy and sad on a typical day, 50% felt both happy and sad on graduation day, $\chi^2 (1, N = 115) = 10.52$, $p < .05$. These findings conceptually replicate those of Study 2 by showing that people can feel both happy and sad not only at

the end of the beginning of college (i.e., on moving out of their dormitory) but also at the end of college altogether.

Results from the other pairs of polar opposite emotions were largely similar to those from Studies 1 and 2. As shown in Table 6 , graduates were not more likely to endorse both members of the three remaining pairs of opposite emotion terms (e.g., *calm — tense*). Thus, acquiescence and random responding again cannot explain why graduates were more likely than nongraduates to report feeling both happy and sad.

We intended to aggregate bittersweet and ambivalent ratings to index the subjective experience of emotional coactivation. In light of the finding that graduates were more likely to feel both happy and sad than were nongraduates, we expected graduates to score higher on this aggregate index as well. Although analyses confirmed this prediction, t (113) = 2.53, $p < .05$, further analyses indicated that bittersweet and ambivalence ratings were significantly but only modestly correlated, r (115) = .27, $p < .05$, suggesting that the two items tap distinct, albeit related, constructs. According to *Merriam-Webster's Collegiate Dictionary* (1993), *ambivalence* refers to simultaneous and contradictory attitudes or feelings (i.e., attraction and repulsion) toward an object, person, or action. In contrast, *bittersweet* refers to a state of pleasure alloyed with pain. Thus, participants may have used *ambivalent* to express their feelings of indecision or uncertainty and *bittersweet* to express their reflective feelings of happiness and sadness. The mean ambivalence ratings were in the predicted direction but did not differ statistically. In contrast, graduates did feel significantly more bittersweet than nongraduates (see Table 5).

It is not clear why participants in the emotionally complex situation felt more bittersweet in Study 3 but not in Study 2. One possibility is that University of Chicago seniors are more familiar with the term *bittersweet* than are OSU freshmen. [7] If so, *bittersweet* may not have broad applicability as a measure of subjective emotional coactivation. In any event, Study 3's *bittersweet* ratings provide further evidence that University of Chicago graduates felt greater mixed feelings than did nongraduates.

General Discussion

In three studies, we found that participants who were surveyed immediately after watching the film *Life Is Beautiful* , moving out of their dormitories, and graduating from college were more likely to feel both happy and sad than were those surveyed in more typical situations. It is important to note, however, that most of our data are consistent with the circumplex prediction that polar opposite emotions are mutually exclusive. Most participants in the typical situation groups felt calm or tense, relaxed or stressed, excited or depressed, and, most important, happy or sad. As do Russell's findings (e.g., Carroll & Russell, 1998, cited in Russell & Carroll, 1999 ; Feldman Barrett & Russell, 1998 ; Russell, 1980), these results provide evidence that the circumplex represents a powerful descriptive model of emotion as it is experienced in typical situations. Polar opposites were largely mutually exclusive in the emotionally complex situations as well, with one critical exception. The finding that many of our participants felt both happy and sad suggests that positive and negative affect are not necessarily bipolar and are therefore inconsistent with the circumplex.

In contrast, by assuming that positive and negative affect can be coactivated, the ESM can account for the co-occurrence of happiness and sadness in emotionally complex situations. Though coactivation is assumed to be possible, it is also thought to provide a poor guide for behavior and is therefore posited to be unpleasant, unstable, and often short-lived. Thus, the ESM can also account for our findings that happiness and sadness were unlikely to co-occur in more typical situations (i.e., steady-state conditions).

Additional Theoretical Perspectives

We have focused on testing the circumplex model and the ESM throughout this article, but our data can also be considered in light of Watson and Tellegen's (1985) model of affect. Though both Russell and Carroll (1999) and Watson et al. (1999) have stated that their models are in substantial agreement, one critical disagreement remains. Whereas Russell and Carroll (1999) argued that happiness and sadness are mutually exclusive, Watson and Tellegen (1999) maintained that sadness decreases as happiness increases. [8] Thus, Watson and Tellegen assumed that happiness and sadness regularly co-occur and that they are only mutually exclusive when people are maximally happy or maximally sad (Watson & Tellegen, 1999 ; see also Russell & Carroll, 1999). Watson and Tellegen did present data from ambiguously unipolar measures consistent with this hypothesis, but they offered no rejoinder to Russell and Carroll's (1999) argument that a bipolar valence continuum implies a mutually exclusive relationship between happiness and sadness, nor did they provide evidence that their own ambiguously unipolar measures are more valid than Russell and Carroll's strictly unipolar measures.

Moreover, Carroll and Russell's (1998; cited in Russell & Carroll, 1999) data and our data are difficult for Watson and Tellegen's (1985 , 1999) position. In typical situations, happiness and sadness were largely mutually exclusive both in Russell and Carroll's studies and our own. Even in our studies' emotionally complex situations, in which many participants did feel both happy and sad, there is little evidence for a linear negative correlation between the two emotions. Although happiness and sadness were negatively correlated after participants watched *Life Is Beautiful* (Study 1; $r = -.43$, $p < .01$), they were uncorrelated on move-out day (Study 2; $r = -.02$, *ns*) and on graduation day (Study 3; $r = -.16$, *ns*). The data from typical situations or from emotionally complex situations may not be especially problematic for Watson and Tellegen, but together they raise doubts that this model provides the most parsimonious account for the data.

Alternative Explanations

As we have discussed, it is possible that participants in emotionally complex situations reported feeling both happy and sad due to acquiescence or random responding. Both explanations, however, have difficulty with the finding that although people in emotionally complex situations were more likely to report feeling both happy and sad than were people in typical situations, they were no more likely to report feeling other pairs of polar opposite emotions (e.g., *calm — tense*). The pattern of findings also rules out more subtle alternative explanations. For example, it is feasible that arousal amplifies unsystematic error and that emotionally complex situations are more arousing than are typical situations. If so, we would expect greater unsystematic error in emotionally complex situations and, consequently, more people to report feeling both happy and sad even if happiness and sadness are mutually exclusive. However, this explanation also assumes that people in emotionally complex situations are more likely to report feeling other pairs of polar opposite emotions; therefore, the explanation cannot account for our data. Moreover, the evidence that emotionally complex situations were more arousing than were typical situations is inconsistent at best. People were more excited on graduation day (Study 3) and move-out day (Study 2) than on typical days, but they were also less tense and less stressed on move-out day. In addition, people in Study 1 were less excited after watching *Life Is Beautiful* than before.

A related possibility is that by asking participants whether they felt happy and sad, we actually prompted the experience of happiness and sadness. Tourangeau and Rasinski's (1988) belief sampling model assumes a similar process in attitude reporting. According to this model, survey respondents sample some but not necessarily all of their considerations or beliefs relevant to their attitude toward a given topic. The model further proposes that the structure of the question or the way the question is asked may bias the sampling of considerations and, by extension, the attitude report. The belief sampling model might also be applied to reports of emotion. It is possible that our participants did not simultaneously feel happy and sad so much as they had the potential to feel happy or sad. When asked if they felt happy,

participants sampled those considerations favoring happiness. Conversely, when asked moments earlier or later whether they felt sad, they sampled those considerations favoring sadness. Daily life, however, provides all but the most and least fortunate among us with a mixed bag of pleasures and pains. If the questions did prompt the emotions, we would therefore expect people to report feeling both happy and sad as a matter of course. However, Carroll and Russell's (1998, cited in Russell & Carroll, 1999) measures of emotion typically reveal happiness and sadness to be largely mutually exclusive, both in their own studies and in our typical situation groups. These data are therefore inconsistent with the biased sampling hypothesis.

An evolutionary argument against the biased sampling hypothesis can also be made. The affect system has been sculpted in complex environments where the opportunity for reward and the threat of punishment often go hand in hand. In the savanna, for example, animals must come to the water to drink even though their predators come there to dine. The organism that can process such appetitive and aversive cues in parallel is better able to swiftly approach or withdraw from environmental stimuli than is an organism that can only sample such conflicting cues in serial. Indeed, a formal property of the ESM is that directional stability is lowest under conditions of coactivation (Cacioppo & Berntson, 1994 ; see also Hass, Katz, Rizzo, Bailey, & Eisenstadt, 1991). Whereas ambivalence has been associated with weak attitudes (e.g., Scott, 1968), from an evolutionary perspective, coactivation can also be seen as affording behavioral flexibility to organisms that live in often hostile, often hospitable worlds.

Mixed Feelings in Context

In addition to our findings that individuals can feel both happy and sad in at least three distinct situations, Beach and Tesser's (1993) extended self-evaluation maintenance (SEM) model points to an entire range of situations that may elicit mixed feelings. Tesser's (1988) original SEM model proposed that emotions are affected by an individual's performance relative to that of a relationship partner, the closeness of the partner, and the importance of the domain to the individual. Beach and Tesser (1993) extended the SEM by proposing that in close relationships, emotions can also be affected by empathic feelings for the partner's sake. For example, a tennis player pitted against her sister in a championship match may be overjoyed to win yet sad that her sister lost. In a test of the extended SEM, Beach et al. (1998) had participants recall situations in which they outperformed or were outperformed by their spouse. In domains that were unimportant to their partner, participants reported more positive than negative affect when they outperformed their partner but more negative than positive affect when they were outperformed. In domains that were important to their partner, however, participants reported comparable levels of positive and negative affect whether they outperformed their partner or were outperformed. Though the latter results may reflect neutral feelings, they could also reflect mixed feelings (Beach et al., 1998).

Supporting evidence comes from an exploratory study in which we asked 203 OSU undergraduates to describe a situation in which they had felt both happy and sad at the same time. Though many participants (36%) left the item blank and others (5%) described situations that did not meet our criteria for mixed feelings (e.g., one individual recalled a moment of happiness on hitting a home run and a summer of sadness after breaking his leg while rounding second base), the majority (59%) described situations in which they apparently felt both happy and sad at the same time. Of these, a sizable proportion (8%) can be interpreted in terms of Beach and Tesser's (1993) extended SEM. These participants recalled feeling happy and sad about outperforming or being outperformed by their close friends or siblings in such domains as academics, athletics, and the arts. One woman wrote, for example, "My best friend and I were both up for a part in a play (the same part). She got the part so I was happy for her but sad also that I didn't get it."

The current research primarily investigates whether people can feel both happy and sad at the same time, but it is also important to consider the functions of emotional coactivation. Whereas much theory and research motivated by positive psychology has focused on the beneficial effects of positive emotions on health outcomes, our coactivation model of healthy coping (J. T. Larsen, Hemenover, Norris, & Cacioppo, in press) proposes that coping with severe stressors requires not only experiencing positive emotions but also experiencing and grappling with the negative emotions associated with the stressor. Consistent with the coactivation model, Spiegel, Bloom, Kraemer, and Gottheil (1989) found that breast cancer patients who were randomly assigned to a support group where they were encouraged to express their feelings about their illness survived twice as long as control patients did. These women achieved happiness not by eliminating their negative emotions but by confronting and, ultimately, accepting them (Spiegel, 1998). As one woman who finally attended the Santa Fe Opera after realizing that she might not be able to wait until she felt better remarked, "I brought my cancer with me and put it in the seat next to me. It was there but I had a wonderful time" (Spiegel, 1998 , p. 67). If happiness is the opposite of sadness, we can only conclude that this woman had neutralized her negative emotions. To the contrary, our findings underscore Spiegel's (1998) conclusion that these patients "came to realize that happiness and sadness are not two poles of one dimension" (p. 67).

Coda

Spiegel's (1998) work highlights that our understanding of the structure of affect must encompass both the common and the uncommon. Though mixed feelings may be uncommon, they might often have important consequences (e.g., for health). Moreover, the very occurrence of emotional coactivation provides powerful tests of theory and fascinating insights into the workings of the affect system. In our view, bipolarity represents the stable endpoint of processes that are organized in a bivariate space rather than a bipolar continuum. By way of analogy, the stable organization of the earth's surface conceals an often-volatile process of shifting tectonic plates and molten rock. Though they disrupt the stable surface, earthquakes and volcanic eruptions also provide a fleeting glimpse of the processes that both underlie and continually recreate that stable surface. In the same way, mixed feelings both disrupt the circumplex and highlight the separability of positive and negative affect at the level of underlying mechanism. Though the circumplex and similar models provide valuable descriptive models of emotion as it is typically experienced, a more complete understanding can only be obtained by also focusing on the underlying affective processes.

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1

Positive and negative activation were originally termed positive and negative affect (Watson & Tellegen, 1985). Watson et al. (1999) renamed the dimensions positive and negative activation. We adopt the newer terms to distinguish the concepts of positive and negative activation from our more general concepts of positive and negative affect.

2

The ANOVAs also revealed several order effects. First, they revealed main effects of form: Participants reported feeling more pleased, happy, and stressed when these emotions appeared in the first half, rather than the second half, of the questionnaire, F (1, 173) = 4.42, 4.69, 4.54, for *pleased* , *happy* , and *stressed* , respectively, all p s < .05. Second, the ANOVAs revealed Situation × Form interactions: There was a Situation × Form interaction on sadness such that the effect of situation was stronger when *sad* appeared in the first half, t (90) = 7.31, p < .05, than when it appeared in the second half, t (83) = 4.58, p < .05. In addition, there was a Situation × Form interaction on displeased ratings such that participants who were surveyed after the film reported greater displeasure when the *displeased* item appeared in the first half, t (83) = 2.70, p < .05, but not when it appeared in the second half, t (90) = .02, *ns* .

3

Because our conceptual question concerns a prediction that differentiates the circumplex and evaluative space models–whether polar opposite emotions can occur irrespective of the absolute levels of the emotions–statistical analyses focused on a dichotomous measure that simply specified whether participants did or did not feel both emotions in a pair.

Additional analyses revealed that those who participated after the film were more likely to report feeling both happy and sad when *sad* preceded rather than followed *happy* (54% vs. 35%), χ^2 (1, N = 107) = 4.04, p < .05. More important, however, the effect of situation (before film, after film) was reliable regardless of item order. When *sad* preceded *happy* , 3% and 53% of participants reported feeling both happy and sad before and after the movie, respectively, χ^2 (1, N = 85) = 23.19, p < .05. When *sad* followed *happy* , 16% and 35% reported feeling both happy and sad before and after the movie, respectively, χ^2 (1, N = 92) = 3.75, p = .05. This order effect was not consistent across studies. In Study 2, the order of *happy* and *sad* did not affect whether participants reported feeling happy and sad in the emotionally complex situation, χ^2 (1, N = 100) = .19, *ns* . Study 3 revealed an order effect in the emotionally complex situation that was opposite to that in Study 1. Specifically, participants were more likely to report feeling both happy and sad when *happy* preceded rather than followed *sad* (64% vs. 36%), χ^2 (1, N = 66) = 4.91, p < .05. Given that these order effects were not consistent across studies and did not qualify the main effects of situation, they are not discussed further.

4

The ANOVA also revealed a Situation × Order of *Happy* Item interaction on happiness. When *happy* preceded *sad* , participants reported feeling happier on move-out day than on a typical day, t (94) = 2.47, p < .05; when *happy* followed *sad* , the opposite pattern was obtained, t (94) = 1.96, p = .05. There was also a Situation × Order of *Calm* Item interaction on tense ratings. Participants reported feeling more tense on move-out day than on a typical day when *tense* preceded *calm* , t (95) = 4.44, p < .05, but not when *calm* preceded *tense* , t (93) = –0.58, *ns* .

5

Participants in the emotionally complex situation were equally likely to report feeling both happy and

sad regardless of whether the measures of subjective emotional coactivation preceded or followed the other emotion items in Study 2, $\chi^2 (1, N = 100) = 1.04$, *ns* , and in Study 3, $\chi^2 (1, N = 66) = 2.97$, *ns* .

6

For exploratory purposes, we also included measures of attitudinal ambivalence toward graduating that are reported elsewhere (see J. T. Larsen, 2001).

7

To examine this possibility, we asked 51 OSU freshmen and 46 University of Chicago seniors to define what it means to feel bittersweet. Two judges who were unaware of the purpose of the study as well as the sources of the definitions assigned each definition a score of incorrect, partially correct, or completely correct ($\alpha = .73$; disagreements were resolved by discussion). OSU freshmen were more than three times as likely to be incorrect as were University of Chicago seniors (24% vs. 7%) and less than half as likely to be completely correct (31% vs. 67%). A *t* test on the judges' trichotomous ratings confirmed that University of Chicago seniors were more familiar with the term *bittersweet* than were OSU freshmen, $t (94) = 3.71$, $p < .05$, $d = .76$.

8

In their response to Russell and Carroll (1999) , Watson and Tellegen (1999) stated, "We assumed that the true relations between positive and negative affects were linear and considered any observed nonlinearities to be the outcome of the skewness differences between the measures that could attenuate the product-moment correlations" (p. 606).

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Correspondence may be addressed to Jeff T. Larsen, Woodrow Wilson School, Princeton University, Princeton, New Jersey, 08544-1013.
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Table 1. Mean Ratings and Standard Errors of Negative and Positive Emotions Before and After Watching Life Is Beautiful *(Study 1)*

Table 1
Mean Ratings and Standard Errors of Negative and Positive Emotions Before and After Watching Life Is Beautiful *(Study 1)*

	Situation			
	Before film		After film	
Item	*M*	*SE*	*M*	*SE*
Positive emotion				
Calm	2.43_a	0.20	1.93_a	0.16
Relaxed	2.31_a	0.20	1.75_b	0.16
Pleased	2.42_a	0.20	1.98_a	0.16
Happy	2.91_a	0.19	2.20_b	0.15
Excited	1.91_a	0.17	0.69_b	0.14
Negative emotion				
Tense	0.48_a	0.16	0.84_a	0.13
Stressed	0.92_a	0.18	0.96_a	0.15
Displeased	0.22_a	0.13	0.57_b	0.11
Sad	0.28_a	0.17	2.14_b	0.14
Depressed	0.30_a	0.15	0.94_b	0.12

Note. Ratings range from 0 to 5. Values in a row with dissimilar subscripts are significantly different at $p < .05$, as assessed by F tests with 173 degrees of freedom in the denominator.

Table 2. Proportion of Participants Who Felt Polar Opposite Emotions Before and After Watching Life Is Beautiful *(Study 1)*

Table 2
Proportion of Participants Who Felt Polar Opposite Emotions Before and After Watching Life Is Beautiful *(Study 1)*

	Situation	
Item pair	Before film	After film
Calm–tense	$.09_a$	$.12_a$
Relaxed–stressed	$.19_a$	$.09_a$
Pleased–displeased	$.06_a$	$.08_a$
Happy–sad	$.10_a$	$.44_b$
Excited–depressed	$.04_a$	$.07_a$

Note. Values in a row with dissimilar subscripts are significantly different at $p < .05$, as assessed by chi-square tests with 1 degree of freedom and $N = 177$.

Table 3. Mean Ratings and Standard Errors of Negative, Positive, and Mixed Emotions on a Typical Day in November and on Move-Out Day in June (Study 2)

Table 3
Mean Ratings and Standard Errors of Negative, Positive, and Mixed Emotions on a Typical Day in November and on Move-Out Day in June (Study 2)

	Situation			
	Typical day		Move-out day	
Item	*M*	*SE*	*M*	*SE*
Positive emotion				
Calm	3.42_a	0.25	3.59_a	0.24
Relaxed	2.95_a	0.26	2.63_a	0.25
Happy	4.17_a	0.24	4.05_a	0.23
Excited	2.12_a	0.26	3.06_b	0.25
Negative emotion				
Tense	1.76_a	0.21	0.72_b	0.20
Stressed	3.40_a	0.26	1.73_b	0.25
Sad	0.81_a	0.24	2.65_b	0.23
Depressed	0.97_a	0.18	0.74_a	0.18
Mixed emotion				
Bittersweet	1.63_a	0.25	1.75_a	0.24

Note. Ratings range from 0 to 7. Values in a row with dissimilar subscripts are significantly different at $p < .05$, as assessed by F tests with 176 degrees of freedom in the denominator.

Table 4. Proportion of Participants Who Felt Polar Opposite Emotions on a Typical Day in November and on Move-Out Day in June (Study 2)

Table 4
Proportion of Participants Who Felt Polar Opposite Emotions on a Typical Day in November and on Move-Out Day in June (Study 2)

	Situation	
Item pair	Typical day	Move-out day
Calm–tense	$.22_a$	$.17_a$
Relaxed–stressed	$.38_a$	$.20_b$
Happy–sad	$.16_a$	$.54_b$
Excited–depressed	$.13_a$	$.18_a$

Note. Values in a row with dissimilar subscripts are significantly different at $p < .05$, as assessed by chi-square tests with 1 degree of freedom and $N = 192$.

Table 5. Mean Ratings and Standard Errors of Negative, Positive, and Mixed Emotions on a Typical Day in July and on Graduation Day in June (Study 3)

Table 5
Mean Ratings and Standard Errors of Negative, Positive, and Mixed Emotions on a Typical Day in July and on Graduation Day in June (Study 3)

	Situation			
	Typical day		Graduation day	
Item	*M*	*SE*	*M*	*SE*
Positive emotion				
Calm	4.31_a	0.39	3.31_b	0.32
Relaxed	2.56_a	0.38	2.95_a	0.31
Happy	4.27_a	0.32	5.08_b	0.26
Excited	1.94_a	0.37	3.69_b	0.31
Negative emotion				
Tense	1.78_a	0.31	1.33_a	0.26
Stressed	2.78_a	0.40	2.03_a	0.33
Sad	0.83_a	0.31	2.07_b	0.26
Depressed	0.71_a	0.26	0.98_a	0.21
Mixed emotion				
Bittersweet	1.12_a	0.36	2.51_b	0.30
Ambivalent	1.81_a	0.37	2.09_a	0.30

Note. Ratings range from 0 to 7. Values in a row with dissimilar subscripts are significantly different at $p < .05$, as assessed by F tests with 99 degrees of freedom in the denominator.

Table 6. Proportion of Participants Who Felt Polar Opposite Emotions on a Typical Day in July and on Graduation Day in June (Study 3)

Table 6
Proportion of Participants Who Felt Polar Opposite Emotions on a Typical Day in July and on Graduation Day in June (Study 3)

	Situation	
Item pair	Typical day	Graduation day
Calm–tense	$.33_a$	$.21_a$
Relaxed–stressed	$.33_a$	$.23_a$
Happy–sad	$.20_a$	$.50_b$
Excited–depressed	$.08_a$	$.14_a$

Note. Values in a row with dissimilar subscripts are significantly different at $p < .05$, as assessed by chi-square tests with 1 degree of freedom and $N = 115$.

Figure 1. The circumplex model of affect. The circumplex model describes affect in terms of the two orthogonal dimensions of valence and activation. From "The structure of current affect: Controversies and emerging consensus," by L. Feldman Barrett and J. A. Russell, 1999, *Current Directions in Psychological Science, 8,* p. 11. Copyright 1999 by the American Psychological Society. Reprinted with permission.

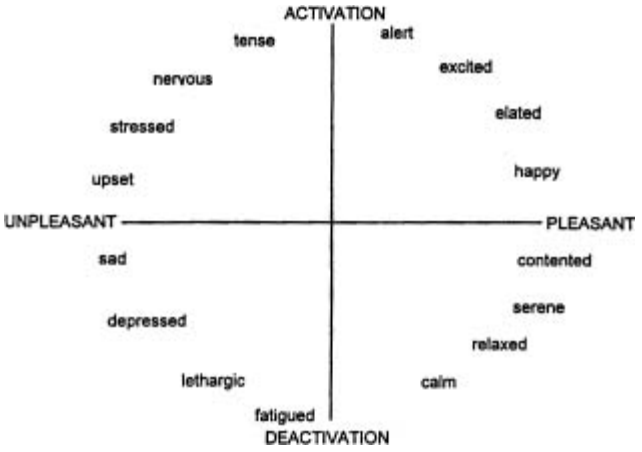

Figure 2. The evaluative space model (ESM). The ESM posits that the experience of valence represents the integration of two separable and partially distinct components of the affect system, one attuned to appetition (i.e., positivity), and the other attuned to aversion (i.e., negativity). The integration of positivity and negativity is represented on the overlying surface. From "Relationship between attitudes and evaluative space: A critical review, with emphasis on the separability of positive and negative substrates," by J. T. Cacioppo and G. G. Berntson, 1994, *Psychological Bulletin, 115,* p. 842. Copyright 1994 by the American Psychological Association.

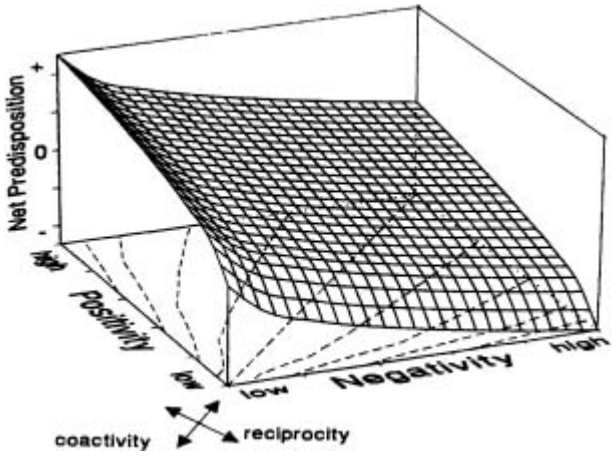

Figure 3. Bivariate distribution of happiness and sadness before (left panel) and after (right panel) the film *Life Is Beautiful* in Study 1. Shaded bars denote co-occurrence of happiness and sadness. Only 10% of participants felt both happy and sad before the film, as compared with 44% after the film.

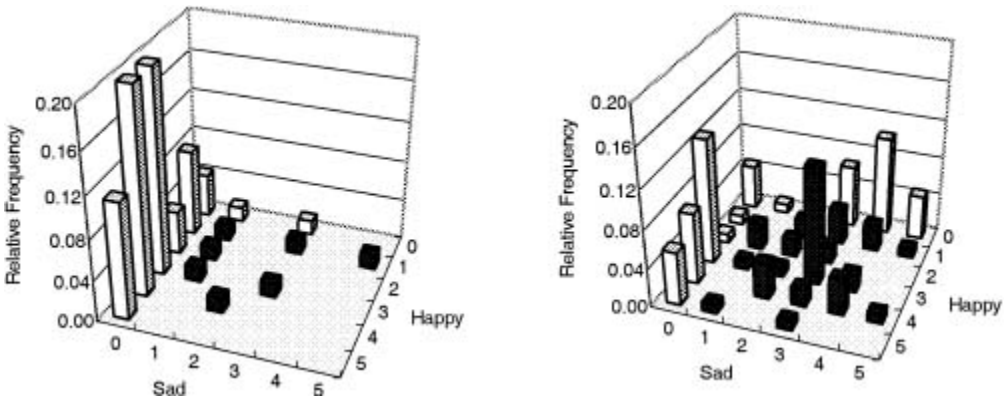

Figure 4. Bivariate distribution of happiness and sadness during a typical day (left panel) and on move-out day (right panel) in Study 2. Shaded bars denote co-occurrence of happiness and sadness. Only 16% of participants felt both happy and sad on a typical day, as compared with 54% on move-out day.

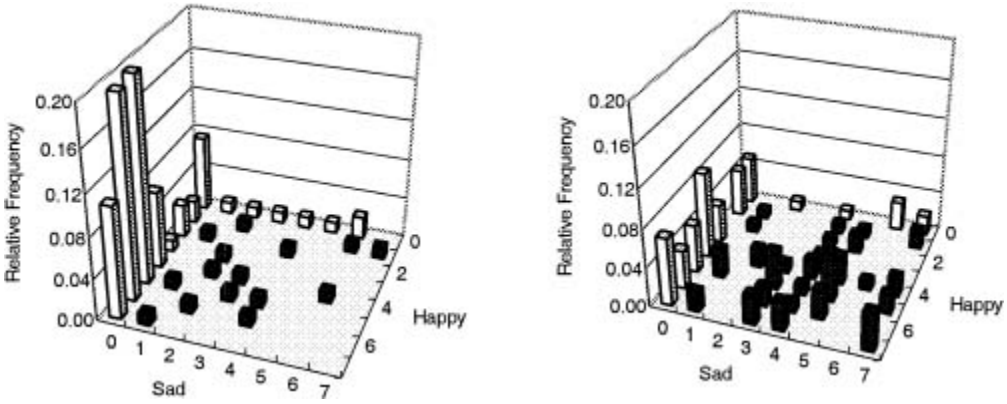

Figure 5. Bivariate distribution of happiness and sadness during a typical day (left panel) and on graduation day (right panel) in Study 3. Shaded bars denote co-occurrence of happiness and sadness. Only 20% of participants felt both happy and sad on a typical day, as compared with 50% on graduation day.