

# Appraisal-Emotion Relationships in Daily Life

John B. Nezlek  
College of William & Mary

Kristof Vansteelandt  
Katholieke Universiteit Leuven and  
University Center St. Joseph Kortenberg

Iven Van Mechelen and Peter Kuppens  
Katholieke Universiteit Leuven

Using a daily process design, the present study examined relationships between momentary appraisals and emotional experience based on Smith and Lazarus' (1993) theory of emotions (1993). Nine times a day for 2 weeks, participants ( $N = 33$ , 23 women) recorded their momentary experience of 2 positive emotions (joy, love) and 4 negative emotions (anger, guilt, fear, sadness) and the core relational theme appraisal contents Smith and Lazarus hypothesized as corresponding to these emotions. A series of multilevel modeling analyses found that the hypothesized relationships between appraisal contents and these emotions were stronger than relationships between contents and other emotions, although appraisals were related to other emotions in many cases. Moreover, there were some individual differences in the strength of these relationships. These results suggest that there are no one-to-one relationships between appraisal contents and specific emotional experiences, and that specific emotions are associated with different appraisal contents, and that specific appraisals are associated with different emotions.

*Keywords:* cognitive appraisal theory of emotions, individual differences, diary study or Ecological Momentary Assessment, multilevel analysis

According to the cognitive appraisal theory of emotions (e.g., Smith & Lazarus, 1993), emotions are activated by people's appraisals of situations. Much of the existing research on this theory has concerned which appraisals are associated with which emotions (e.g., Ortony, Clore & Collins, 1988; Roseman, Spindel, Jose, 1990; Scherer, 1984; Smith & Lazarus, 1993). By and large, this research has found relationships between emotions and core relational themes as suggested by Smith and Lazarus. Appraisals of other-blame, self-blame, danger/threat, and irrevocable loss/helplessness tend to be associated with anger, guilt, fear, and sadness, respectively; goal achievement tends to be associated with joy (Lazarus, 1991; Oatley & Duncan, 1994), and positive interpersonal encounters are associated with interpersonal emotions such as love (Lazarus, 1991).

Despite the considerable attention the cognitive appraisal theory of emotion has received, we believe there are important limitations to this research. Specifically, the majority of research on cognitive

appraisal theory has examined relationships between appraisals and emotions by using hypothetical vignettes or autobiographical recall (Levine, 1996). In vignette studies, participants are asked to imagine that they are in certain situations, and they describe how they think they would feel if they were in that situation. In autobiographical studies, participants are asked to recall events, and they describe how they felt.

Both types of studies suffer from important shortcomings. For example, vignettes may lack the immediacy and personal importance of actual events, and people may draw on stereotypes and other sources when responding to vignettes (Levine, 1996). Moreover, Parkinson and Manstead (1993) argued that vignettes are more ambiguous and open to interpretation than real events. Studies based on autobiographical memories may also be prone to various biases. For example, people have the tendency to report prototypical or particularly salient situations that evoked an emotion, while they will tend to exclude less prototypical and less salient events (Robinson & Clore, 2002). Also, retrospective reports of feelings that occurred during an event can be distorted by knowledge of the resolution of that event (e.g., Brewer, 1994).

## Present Study

The present study was designed to examine the appraisal-emotion relationships described by Smith and colleagues (Smith & Lazarus, 2003) in naturally occurring situations. Our primary purpose was to examine the extent to which people's daily emotional experiences are associated with the *core relational themes* (core appraisal contents) as described by Smith and Lazarus (1993), that is, whether such relationships follow the dominant patterns described by Smith and Lazarus. These relationships were:

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John B. Nezlek, College of William & Mary; Kristof Vansteelandt, Katholieke Universiteit Leuven and University Center St. Joseph Kortenberg; Iven Van Mechelen and Peter Kuppens, Katholieke Universiteit Leuven.

The research reported in this paper was supported in part by Grant GOA/2005/04 of Katholieke Universiteit Leuven, Grant G.0327.01N of the Fund for Scientific Research (Flanders), and a fellowship for John Nezlek (F/04/040 and F/05/047) from the Research Fund of Katholieke Universiteit Leuven (Belgium). Peter Kuppens is a postdoctoral research fellow with the Fund for Scientific Research (Flanders).

Correspondence concerning this article should be addressed to John B. Nezlek, Department of Psychology, College of William & Mary, P. O. Box 8795, Williamsburg, VA 23187-8795. E-mail: john.nezlek@wm.edu

1. Other-blame—Anger.
2. Self-blame—Guilt.
3. Danger/threat—Fear.
4. Loss/helplessness—Sadness.
5. Achievement—Joy.
6. Positive encounters—Love.

Our first goal concerned average or typical relationships. For example, is the relationship between self-blame and guilt stronger than the relationship between self-blame and anger? Our second goal was to examine how these relationships varied across individuals. For example, is the relationship between self-blame and guilt equally strong for everyone? It is important to note that the first goal concerns how appraisals and emotions are associated on average, whereas the second goal concerns variability across individuals around such averages.

We used experience sampling so that we could be certain that people described their momentary appraisals and emotions as they experienced them. To our knowledge, only one study (Tong et al., 2005) has provided such an ecologically valid test of appraisal theory, although this study examined only one emotion, happiness, and did not examine the possibility of individual differences in appraisal-emotion relationships.

There is some disagreement about the strength of the relationships between appraisal contents and emotional experience. Some theorists posit that specific emotions are invariantly associated with specific appraisals, whereas others do not (see Kuppens, Van Mechelen, Smits, & De Boeck, 2003). For example, Roseman and Smith (2001) argued that “appraisal theories maintain that a common pattern of appraisals is found in all the situations that evoke the same emotion [and] that there should be strong and invariant one-to-one relationships between particular appraisal combinations and particular emotions” (p. 7). In contrast, other theorists suggest that appraisal-emotion relationships are not invariant. For example, Scherer (2001) stated that “appraisal theorists do not assume that the typical appraisal profile is always required to produce the emotion” (p. 373).

In terms of individual differences in appraisal-emotion relationships, there is a lack of agreement among theorists about the existence of such differences. Some theorists assume strong, invariant, one-to-one relations between specific appraisals and emotional experiences (e.g., Roseman & Smith, 2001) and de facto eliminate the possibility of individual differences in appraisal-emotion relations. In contrast, others have recognized the importance of individual differences in appraisal-emotion relationships (Lazarus, 1994; Scherer, 1999).

Although individual differences in appraisal-emotion relationships have not been studied that closely, there is some research suggesting that individual differences in appraisal-emotion relationships exist. Parkinson (1999) found that appraisal profiles for anger and guilt varied as a function of the extent to which the emotion was rational or not. Similarly, Kuppens, Van Mechelen, Smits, De Boeck, and Ceulemans (2007) found individual differences in relationships between appraisals and anger. Although suggestive, this research is not extensive enough to answer broader

questions about individual differences in appraisal-emotion relationships.

Given the existing research, our primary hypothesis was simply that appraisal-emotion relationships would vary across individuals. On an exploratory basis, we also examined the association between appraisal-emotion relationships and individuals' typical (i.e., mean) emotional response. For example, do people who are more nervous/fearful on average react more or less to anxiety relevant appraisals than people who are less nervous/fearful on average?

Finally, in general, appraisal theories posit that appraisals are proximal elicitors of emotional experience; however, some theories posit that appraisals constitute the content of emotional experience (e.g., Frijda, 1993), for example, the experience of anger consists of feelings of other blame. Nevertheless, in this paper, we consider associations between emotions and appraisals without making assumptions about causal relationships.

## Method

### Participants

Participants were 36 students from the University of Leuven who were recruited via the university Job Service Center. Participants received 40 € for taking part in the study. The sample consisted of 13 men and 23 women with a mean age of 22.17 ( $SD = 2.42$ , min = 19; max = 33).

### Procedure

Participants were introduced to the study individually. They were told that the purpose of the study was to examine how they experience emotions during daily life and that for 2 weeks they would complete a brief questionnaire nine times a day, when signaled to do so by a watch they were given. We emphasized that they should report as many signals as possible but that they might miss some signals for various reasons. We stressed that their participation would still be useful even if they missed some signals.

### Experience Sampling Questionnaire

Following Lazarus (1991), we selected two positive and four negative emotions: joy, love, and anger, guilt, fear, and sadness. Each emotion was measured with two items, and responses to these two items were averaged to create a score. The participants spoke Dutch, and the original Dutch items are listed below with English translations.

- Joy: *Tevreden* (content), *Gelukkig* (happy)
- Love: *Sympathie* (sympathy), *Genegenheid* (affection)
- Anger: *Irritatie* (irritation), *Kwaad* (angry)
- Guilt: *Beschaamd* (ashamed), *Schuldig* (guilty)
- Fear: *Nerveus* (nervous), *Bang* (fear)
- Sadness: *Droevig* (sorrow), *Verdrietig* (sad)

Each item consisted of the phrase “At this moment, I feel” followed by an emotion word, and items were presented in a random order in the booklets.

We also included measures of the six relational themes (appraisals) corresponding to these emotions. Each of these measures started with “At this moment,” followed by: (a) I experience a success, (b) I experience a positive encounter, (c) I blame someone

else, (d) I blame myself, (e) I feel threatened, and (f) I experience a loss. Finally, participants described when they completed the questionnaire by answering the following question: "At this time, it is . . . hour . . . minutes."

### Experience Sampling Protocol

Participants received a wristwatch, a pencil, and enough booklets for the study. Each day for 2 weeks they received nine beeps. The beeps were programmed according to a stratified random interval time series (Delespaul, 1995). Each day was divided into nine successive blocks of 90 minutes starting from the moment the person was woken up by the alarm of the watch. Participants chose when they would awaken. Within each block of 90 minutes, one beep was generated, and each minute of the time block had the same probability of being selected. After each beep, participants indicated on an 11-point scale ranging from 0 (*not applicable at all*) to 10 (*completely applicable*) to what extent the six relational themes and emotions were applicable to them just before the moment of the beep.

## Results

### Compliance With Protocol

It is common in experience sampling studies (ESM) studies to exclude assessments that are reported outside a 15 minute time window (Delespaul, 1995). Using this criterion, out of a possible 4,536 observations, 3,746 observations (83%) were retained for analysis, which is good in comparison with similar studies (e.g., Hektner & Csikszentmihályi, 2002). The mean number of observations per participant was 104 ( $SD = 17$ ), and 90% of participants had 75 or more observations.

### Descriptive Statistics

The basic analyses were three-level multilevel models in which observations were nested within days that were nested within persons. See Nezlek (2001) for a description of using multilevel modeling to analyze daily diary data. Before examining relationships between emotions and appraisals, descriptive statistics for all measures were generated using a series of "totally unconditional models," (i.e., models in which there were no predictors at any of the three levels of the model). These analyses estimated the means and the amount of variance that was within-days, between-days, and between-persons.

In terms of the emotion measures, two clear patterns emerged. First, negative emotions were much less pronounced in people's daily lives than positive emotions. Although significance tests of the differences between these means were not possible within the current framework, it is clear from the means in Table 1 that negative emotions did not occur as frequently as positive emotions. The means for the four negative emotions were 1 or less, whereas the means for the positive emotions were above 3. Second, across all emotions, the majority of the variance was within-days, although there was meaningful variance at the between-day and between-person levels. The fact that the majority of variance was within-days suggests that our ESM technique successfully captured momentary changes in emotions.

Table 1  
*Descriptive Statistics for Emotions and Core Relational Themes*

	<i>M</i>	Variance estimates			
		Within day	Between day	Person	
Emotions					
Anger	1.10	2.44	0.29	0.58	.95
Guilt	0.43	0.54	0.14	0.28	.58
Fear	0.97	1.41	0.42	0.71	.51
Sadness	0.88	1.46	0.67	0.70	.92
Joy	5.11	3.82	1.21	1.64	.97
Love	3.58	4.81	1.49	3.32	.86
Appraisals					
Other-blame	1.34	4.41	0.69	0.98	
Self-blame	0.86	2.26	0.46	0.54	
Threat	0.46	0.70	0.23	0.60	
Loss	0.55	1.06	0.23	0.64	
Success	1.45	3.00	0.50	2.10	
Positive-encounter	3.16	7.47	1.60	1.79	

The unconditional analyses of appraisals produced similar distributions of variances. Although there was meaningful variance at the between-day and between-person levels, for all appraisals the largest part of the variance was within-days, suggesting that our ESM technique successfully captured momentary changes in appraisals. Moreover, the fact that within-day variance was the greatest for both emotions and appraisals confirmed the appropriateness of the three-level model we used to examine appraisal-emotion relationships.

### Appraisal-Emotion Relationships

The primary hypotheses of the study concerned the covariation (relationships) between participant's appraisals of their environments and their emotional responses. More specifically, we expected that for each emotional response, the relationships between a certain appraisal and that response would be stronger than the relationships between other appraisals and that response. We refer to this hypothesized, strongest relationship as the "primary" relationship: Other-Blame for Anger, Self-Blame for Guilt, Threat for Fear, Loss for Sadness, Success for Joy, and Positive-Encounters for Love. Within the nomenclature of multilevel modeling, such relationships are referred to as "slopes."

Each of the six emotion scores was analyzed separately using a model in which the emotion was a dependent measure, and the six appraisal themes were predictors. These analyses estimated emotion-appraisal relationships for each theme for each person and estimated a mean relationship for the sample. Each of these coefficients was entered "group-mean centered," which meant that day and person level differences in appraisals did not contribute to parameter estimates (Nezlek, 2001). The analyses were conducted using the program HLM (Raudenbush, Bryk, Cheong, & Congdon, 2004). Initially, all coefficients were modeled as random. Coefficients were fixed according to guidelines suggested by Nezlek (2001).

The coefficients (slopes) representing relationships between emotions and appraisals are presented in Table 2. As can be seen from these results, the slopes representing the hypothesized relationships, the "primary slopes," were (with one exception) larger

Table 2  
*Relationships between Emotions and Core Relational Themes*

Emotion	Core relational themes					
	Other-blame	Self-blame	Threat	Loss	Success	Positive-encounter
Anger	<u>.32</u> ***	.12***	-.02	.07*	-.06***	-.06***
Guilt	.00	<u>.19</u> ***	.09*	.08***	-.01*	.00
Fear	.08***	.10***	<u>.35</u> ***	.04	-.03	-.03**
Sadness	.08***	.09**	.13*	<u>.32</u> ***	-.03**	-.02*
Joy	-.23***	-.14***	-.19***	-.08*	<u>.27</u> ***	.24***
Love	-.10***	-.06***	-.07*	-.00	.10***	<u>.46</u> ***

Note: Coefficients underlined represent hypothesized relationships.

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

in terms of absolute values than the slopes representing nonhypothesized relationships. Other-Blame was the best predictor for Anger, Self-Blame was the best for Guilt, Threat was the best for Fear, Loss was the best for Sadness, and Positive-Encounter was the best for Love. The exception to this pattern was Joy. Relationships between Joy and Positive-Encounters and Joy and Other-Blame (negative relationship) were approximately of the same strength as the hypothesized relationship between Joy and Success.

Additional confirmation of the differences in the strengths of these relationships was provided by statistical comparisons of these slopes. For each emotion, the strength (absolute value) of the primary slope was compared to the strength of other slopes. This was done by examining the impact of the fit on each model of constraining pairs of slopes to be equal, or to have equal absolute values. A significant chi-square indicates that a constraint leads to a poorer fit, that is, the pair of slopes are not the same (Nezlek, 2001).

The results of these analyses were quite clear. For Anger, the slope for Other-Blame was larger than all the other slopes (all  $ps < .001$ ). For Guilt, the slope for Self-Blame was larger than all the other slopes (all  $ps < .001$ , except for Threat,  $p < .05$ ). For Fear, the slope for Threat was larger than all the other slopes (all  $ps < .001$ ). For Sad, the slope for Loss was larger than all the other slopes (all  $ps < .001$ , except for Threat,  $p < .01$ ). For Love, the slope for Positive-Encounter was larger than all the other slopes (all  $ps < .001$ ). In contrast, differences in the slopes for Joy were less consistent with expectations. The slope for Success was not different (in absolute value) from slopes for Other-Blame and Positive-Encounter, although it was significantly different from the remaining slopes, Self-Blame ( $p < .05$ ), Threat ( $p < .001$ ), and Loss ( $p < .001$ ).

#### *Individual Differences in Appraisal-Emotion Relationships*

Coefficients in a multilevel model can vary two ways: randomly, and fixed, in terms of individual differences in other measures (e.g., Nezlek, 2001), and we examined individual differences in appraisal-emotion relationships in both ways. First, we examined the random term associated with each of the primary slopes. The presence of a significant random term means that a slope varies randomly. The random terms for the primary slopes for Anger, Guilt, Joy, and Love were significantly different from 0 ( $ps < .01$ ), and the random terms for the primary slopes of Fear

and Sadness approached conventional levels of significance ( $p < .10$ ).

Second, we examined individual differences in primary slopes as a function of participants' mean emotional responses. These relationships were examined by including a variable representing a participant's mean emotional response in the person-level model of each equation predicting the primary slope. Prior to analysis, these scores were standardized. For example, for the analysis of the relationship between Other-Blame and Anger, mean Anger was included in the person-level (Level 3) model, whereas for Loss-Sadness, mean Sadness was included at Level 3. To avoid exceeding the carrying capacity of the data, and because these relationships were not of primary interest, these mean scores were not included in the equations modeling the slopes for nonprimary appraisals.

For three of the six emotional responses, mean emotional response was significantly related to the strength of the primary slope. For Guilt and Love, this relationship was positive and sizable ( $\gamma = .15$  and  $.32$ , respectively,  $p < .001$ ). For these two emotions, people who had stronger emotional responses tended to have stronger relationships between appraisals and responses, that is, they were more reactive. For joy-success, the relationship was negative ( $-.06$ ,  $p < .01$ ). Because the person-level means were standardized, the coefficients represent the estimated change in slopes associated with a 1 *SD* increase in the person-level mean included as a predictor.

#### Discussion

This study was designed to examine the extent to which the appraisal-emotion relationships hypothesized in the appraisal theory formulation of Smith and Lazarus (1993) occur in daily life. Our study was guided by two interrelated questions. First, are the appraisal-emotion relationships posited by Smith and Lazarus the dominant relationships? Second, to what extent do such relationships vary across individuals?

The results clearly supported Smith and Lazarus's (1993) contention that certain appraisal-emotion relationships are stronger than others. Appraisals of Other-Blame led to feelings of anger, appraisals of Self-Blame led to feelings of guilt, and so forth. This finding is important because appraisal-emotion relationships were examined *in vivo*, during the ebb and flow of people's daily emotional lives, and most previous research has relied on vignettes

and autobiographical recall, methods that we believe are prone to various biases.

Our results provide mixed support for the type of invariant appraisal-emotion relationships such as those suggested by Roseman and Smith (2001). In support of such invariance, we note that although there were relationships between “nonprimary” (i.e., not hypothesized) appraisals and emotional responses, with the exception of Joy, these relationships were not as strong as the predicted, primary relationships. Not only were such nonprimary relationships statistically different from the primary relationship, they were also meaningfully weaker in absolute terms. All were less than 50% as strong, and most were much less than that. Moreover, follow-up analyses in which only primary slopes were analyzed found coefficients ranging from .4 to .5. Keeping in mind that all coefficients in these analyses are unstandardized, this means that experienced emotions changed about half point for every point change in appraisals.

On the other hand, specific emotions were also significantly associated with other, nonhypothesized appraisals. These results suggest that although the appraisal-emotion associations described in the cognitive appraisal theory of emotion are the dominant associations, an appraisal may be associated with more than one emotional response. As such, these findings do not suggest that appraisals are invariantly related in one-to-one relationships to emotional experience. Rather, they suggest that emotions can be associated with different appraisal contents and that appraisals can elicit different types of emotions.

From this perspective, relations between appraisals and emotions can be considered to be a loosely coupled system in which dominant relationships between certain appraisals and emotions are complemented by weaker but meaningful cross-relationships between other appraisal-emotion associations. Moreover, it should be noted that our findings are based on the emotion reports of participants from a western nation. It is possible that different appraisal-emotion relationships exist in other cultures (e.g., Mesquita & Ellsworth, 2001).

Individual differences in appraisal-emotion relationships were the second focus of the present study, and we found that relationships between emotions and their primary appraisals differed in strength across individuals. Such findings are inconsistent with models that posit invariant relationships between emotions and their central appraisals, and they imply that some individuals react more emotionally to certain appraisals than others. This may be due to the fact that some people have become insensitive or invoke regulation strategies to inhibit emotional experience, or because they are chronically prone to experience an emotion. These findings also suggest that people may differ in what specific emotional experiences mean to them. Individual differences in strength of appraisal-emotion relationships may signify that the meaning of being “angry,” “sad,” and so forth differs from person to person. For some, feeling angry might be strongly related to feelings of other blame, whereas for others, other blame may be less central to the experience of anger. As such, our findings suggest that people experience the world in different ways in terms of what it means to say that one is “angry,” “sad,” or feels “guilt,” “fear,” “joy,” or “love.”

Individual differences in appraisal-emotion relationships may also reflect individual differences in emotional reactivity or sensitivity to situational cues and may reveal how much an individ-

ual’s appraisal of the circumstances contributes to his or her emotional experience. The strength of appraisal-emotion relationships may indicate how reactive individuals are toward psychologically meaningful elements in the environment, and such strength could range from rigid to overly sensitive. Individual differences in appraisal-emotion relationships may also reflect individual differences in discriminative facility (e.g., Cheng, Chiu, Hong, & Cheung, 2001; Wright & Mischel, 1987). Discriminative facility refers to how sensitive and receptive individuals are toward environmental cues, and it is a basic component of interactional models of personality.

Given the lack of existing research and theory regarding individual differences in appraisal-emotion relationships it is not possible to determine which of these and other possible processes can account for these differences. Moreover, the sample was not particularly large in terms of examining such differences. Nevertheless, our results provide ecologically valid support for some aspects of appraisal theories of emotions, and they strongly suggest that appraisal theorists should take into account individual differences in appraisal-emotion relationships. Our results clearly indicated that individuals can react differently toward emotional-eliciting appraisals, and they suggest that appraisal theories should consider this source of variability in explaining variability in emotional responding.

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Received August 3, 2006

Revision received May 29, 2007

Accepted June 28, 2007 ■