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BRIEF REPORT

The coherence of emotion systems: Comparing ''on-line'' measures of appraisal and facial expressions, and self-report

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Recently, investigators have challenged long-standing assumptions that facial expressions of emotion follow specific emotion-eliciting events and relate to other emotion-specific responses. We address these challenges by comparing spontaneous facial expressions of anger, sadness, laughter, and smiling with concurrent, ''on-line'' appraisal themes from narrative data, and by examining whether coherence between facial and appraisal components were associated with increased experience of emotion. Consistent with claims that emotion systems are loosely coupled, facial expressions of anger and sadness co-occurred to a moderate degree with the expected appraisal themes, and when this happened, the experience of emotion was stronger. The results for the positive emotions were more complex, but lend credence to the hypothesis that laughter and smiling are distinct. Smiling co-occurred with appraisals of pride, but never occurred with appraisals of anger. In contrast, laughter occurred more often with appraisals of anger, a finding consistent with recent evidence linking laughter to the dissociation or undoing of negative emotion.

Claims about the meaning of facial expression have shifted over time (Keltner & Ekman, 2000; Russell, 1994). It was once widely believed that facial expressions convey little about the experience of emotion and emotion-related events (e.g., Taguiri, 1957). An alternative view then developed which holds that facial expressions typically co-occur with the experience of emotion, although the extent of this covariation depends on display rules and contextual factors (e.g., Ekman, 1994; Izard, 1994).

Yet again intellectual tides seem to be shifting, as researchers have challenged the view that facial expression is associated with emotion-specific events and experience. In

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response to this debate, we report evidence related to whether facial expressions of anger and sadness and laughter and smiling relate to emotion-specific measures of appraisal, as captured in spontaneous narrative discourse, and experience. We also examined the assumptions regarding how facial expression and narrative combine to predict the experience of emotion.

Types of coherence in facial expression of emotion

Claims about coherence in facial expression translate to three empirical predictions. First, the muscle actions of a facial expression will occur in a coordinated fashion (Ekman, 1993). For example, Keltner (1995) demonstrated that the components of the embarrassment display, including gaze aversion, controlled smile, face touch, and head movement, occur in systematic fashion within a 5 second period. We refer to this as *within-system coherence*.

Second, facial expressions of emotion will correspond to appraisals of emotion-eliciting events. For example anger-related expressions would be associated with appraisals of injustice (Lazarus, 1991). Similarly, component facial actions, such as the furrowed brow, should be associated with theoretically relevant appraisals, such as the appraisal that one's goals have been blocked (Smith, 1989; Smith & Scott, 1997). We refer to the coherence between the appraised event and facial expression as *event-response coherence*.

Third, facial expressions will be associated with other emotion-related responses, such as experience and physiology. We refer to this as *between-system coherence*. These distinctions help bring into focus recent controversies surrounding the coherence of facial expression of emotion.

Challenges to the assumption of coherence in facial expression of emotion

A prevalent view in the study of emotion is that facial expressions are coherent (e.g., Ekman, 1993; Keltner, 1995; Rosenberg & Ekman, 1997). According to this view, emotion-specific events trigger emotion-related experience, physiology, and expressive tendencies (Ekman,1993). Expression is then shaped by salient cultural display rules and contextual factors, such as the status or familiarity of the individuals in the immediate social environment. Facial expressions correspond, at least to some degree, to the emotionally evocative event and underlying experience (e.g., Keltner & Ekman, 2000; Matsumoto, 1987). The influence of display rules suggests that this will not be a one-to-one correspondence; instead, facial expressions are likely to be loosely coupled with emotion antecedents and underlying experience (Bonanno, Keltner, Holen, & Horowitz, 1995; Izard, 1977; Lang, Levin, Miller, & Kozak, 1983).

This view has been challenged recently in several ways. One challenge has been directed at event-response coherence, calling into question whether facial expressions of emotion co-occur with emotion-specific events or appraisals. Fridlund (1992) argued that in some contexts, for example in aggressive encounters, it may be disadvantageous for the individual to display emotions appropriate to that context (in this example, anger).

Do facial expressions correspond to emotion-specific events or appraisals? The evidence here is surprisingly modest (e.g., Keltner et al., 2001). Duchenne or enjoyment smiles (Frank, Ekman, & Friesen, 1993) do follow pleasurable events, such as the

approach of a loved one (Fox & Davidson, 1988) or the viewing of a positive film clip (Ekman, Friesen, & Ancoli, 1980). Select studies have shown that disgust expressions occur in response to films of mutilation (Ekman et al., 1980). Smith and colleagues have documented that components of facial expressions of emotion, such as the furrowed brow, are associated with theoretically relevant appraisal dimensions, such as perceived obstacle (Smith, 1989; Smith & Scott, 1997).

However, Camras et al. (1998) found that children did not show prototypical surprise expressions following prototypical elicitors of surprise. We could find no evidence showing that prototypical facial expressions of anger and sadness follow emotion-specific events.

Others have called into question the between-system coherence of facial expression, challenging whether facial expressions of emotions are associated with emotion-specific experience (Fernández-Dols, Flor, Pilar, & Ruiz-Belda, 1997; Fernández-Dols & Ruiz-Belda, 1997). Some studies have found modest correlations between facial expressions and self-reports of emotion (e.g., Keltner et al., 2001; Rosenberg & Ekman, 1994). Other studies have yielded nonsignificant relations between expression and experience (Fernández-Dols et al., 1997; Fridlund, 1991). Again, we could find no evidence for the relationship between facial expressions of sadness and anger and emotion-specific experience. Clearly more evidence is needed linking specific facial expressions of emotion with emotion-specific events and experience (see Fernández-Dols & Ruiz-Belda, 1997).

Methodological requirements for the study of coherence in emotion

Studies of the coherence of facial expression yield the strongest inferences when guided by the following criteria. First, it is best to study relatively *intense* emotions. Weak emotional stimuli may not generate observable emotional responses (Tassinary & Cacioppo, 1992).

Second, it is important to ensure that an event did indeed elicit the emotions of interest in the response systems of interest. In several studies that reported a lack of correspondence between expression and eliciting event, researchers only assessed emotion in one system (e.g., facial expression), and neglected to assess emotional experience and appraisal. For example, Fernández-Dols and Ruiz-Belda (1995) reported a lack of smiling among Olympic gold medal recipients as they received their medals, arguing against event-response coherence. These researchers did not measure emotional experience, however. Gold medal winners may not have smiled because they might have experienced emotions other than happiness, such as awe, gratitude, relief, or sadness.

Third, it is best to examine the contemporaneous associations between emotion-related responses in precise, time-resolute fashion (Scherer, 1993). To the extent that the measurement of emotion-related responses is separated by time, intervening variables reduce the likelihood of assessing coherence (Rosenberg & Ekman, 1994). This is particularly important when studying emotion-related appraisals, because retrospective self-reports confound spontaneous appraisals with cognitive elaborations, justifications, or defensive processes that may occur after the emotion has been generated (Frijda, 1993).

Fourth, it is important to study *several* emotions. In studies of a single intense emotion (e.g., disgust elicited by an amputation film), the co-occurrence of responses may be an

artifact of that emotion's high base-rate (Fernández-Dols & Ruiz-Belda, 1997). Claims about the coherence of emotion presuppose that the response profile of one emotion differs from that of another emotion. It is therefore most convincing to show that the emotion-specific responses of similar emotions are coherent and do not correlate with one another.

Rationale and hypotheses of current investigation

In the present study, we asked whether facial expressions of sadness and anger, and smiling and laughter, show a moderate degree of relation to emotion-specific experience and appraisals, within the context of a real-world, highly emotional event: Bereaved individuals talking about the recent death of their spouse. Facial expression and appraisal data were coded from participants' spontaneous behaviour during the interview, and self-reports of emotional experience were gathered after. Although appraisals are assumed to cause emotion, some theorise that they also persist during the course of an emotional event (e.g., Lerner & Keltner, 2000, 2001; Roseman & Smith, 2001; Smith & Kirby, 2000). Based on this rationale, we examined whether appraisals assessed spontaneously in participant's narrative discourse related to concurrent facial expressions of emotion. Although there are several compelling theories of emotion-related appraisal (e.g., Roseman, Antoniou, & Jose, 1996; Scherer, 1993; Smith & Ellsworth, 1985), we relied on Lazarus' characterisation of emotion-specific core-relational themes to code spontaneous appraisals. Lazarus' (1991) core-relational themes model seemed to manifest clearly in bereaved individuals' spontaneous discourse, and has shown strong association with bereavement outcome (Bonanno, Mihalecz, & LeJeune, 1999).

We focused our analyses on two emotions prototypically observed during bereavement, sadness and anger, and their associated appraisal themes of loss and injustice (Bonanno & Kaltman, 1999). We also focused on themes of happiness and pride, as well as smiling and laughter expressions. Although traditionally such positive themes and expressions were viewed as incompatible with the experience of grieving, recent reports attest to their prevalence in interviews among bereaved individuals (Bonanno et al., 1999; Keltner & Bonanno, 1997).

With this paradigm and these measures, we satisfied the four criteria for examining the coherence of facial expression. We studied intense emotions (Bonanno & Keltner, 1997; Bonanno et al., 1999). We measured multiple components of emotion. We looked at the contemporaneous association between emotion-related appraisals and facial expression. And we assessed the coherence of different but related emotions.

In terms of event-response coherence, we expected facial expressions of sadness to co-occur with verbal discourse about loss, facial expressions of anger to co-occur with the discussion of injustice, and Duchenne smiles with themes of happiness (making progress towards a goal) and pride (taking credit for a desired object or achievement). Our prediction regarding Duchenne laughter may at first appear counterintuitive, but was derived from considerable theory and research. Based on claims that pleasurable laughter, like humour (Martin & Lefcourt, 1983; Ruch, 1983), is a form of dissociation that accompanies reductions in negative emotion (e.g., Keltner & Bonanno, 1997), in particular anger (Tomkins, 1984), we predicted that laughter would co-occur with anger-related appraisals (e.g., injustice).

In terms of between-system coherence, we expected facial expressions of sadness to correlate with self-reports of distress, facial expressions of anger to correlate with self-reports of anger, Duchenne but not non-Duchenne smiles to correlate with self-reports of joy, and Duchenne laughter to correlate with self-reports of joy and reduced anger. In addition, we examined the commonly held but under-researched assumption that emotional experience is elevated when multiple emotion systems operate concurrently (Damasio, 1994; Ekman, 1992; Ortony & Turner, 1990). This assumption was formalised in predictions that when either sadness, anger, or happiness were expressed in both channels (e.g., facial expressions and verbal themes), the experience of that emotion would be elevated.

METHOD

Narrative, facial, and self-report data were available from 31 conjugally bereaved individuals recruited as part of a longitudinal bereavement study (Bonanno et al., 1995). Participants ranged in age from 39 to 55 years ($M = 50.8$, $SD = 4.31$), were 69% female , 84% Caucasian, and had a mean family income of US$59,100 ($SD = 18,000$). There were no statistically meaningful demographic differences between these participants and the remaining sample from the larger project ($ps > .10$).

Between 5 and 6 months of bereavement, participants were invited to speak freely and without interruption for approximately 18 minutes about their deceased spouse and other important ongoing relationships. Participants were seated before an interviewer. A small one-way mirror hid a camera on the opposite wall of the participant. Only data from the first prompted topic are reported in this study. This prompt asked participants to describe their relationship with their deceased spouse and how they reacted to the loss of that relationship. Instructions stated that the interview was designed to learn more about ''your experience of bereavement'', that the interviewer would be listening closely and keeping track of the time but would speak only to ask clarifying questions, and that the best way to approach the task was to ''try to relate as openly as possible whatever comes to your mind''. For a more detailed description of the interview task, see Bonanno et al. (1995).

Participant's verbal utterances during the first 6 minutes of the interview were transcribed and segmented into Narrative Units (NUs) ranging from a few words to several sentences based on coders' intuitive understanding of the natural boundaries of a complete thought or idea. Interrater agreement for NU markers was .81. Final NU boundaries were determined by using the majority ratings of three judges.[1] Each NU was coded for the presence/absence of appraisal themes for anger (injustice), sadness (loss), happiness, and pride based on operational definitions adapted from Lazarus' (1991). Appraisal components for these emotions and text examples are presented in the Appendix. All coding was done by two graduate students who were blind to the goals of the study. Interrater agreement, coded from seven randomly selected transcripts (177 NUs), was adequate (overall kappa = .86).

Facial expressions of anger, sadness, smiling, and laughter were coded from videotapes of the interview using a version (EMFACS) of the Facial Action Coding System

[1] The use of the kappa statistic as a measure of rater agreement is inappropriate in this case because, hypothetically, an infinite number of NU boundaries may be scored.

(FACS: Ekman & Friesen, 1978). EMFACS concentrates on coding only the emotion-relevant facial muscle movements that have been derived from previous theory and research (reviewed in Ekman, 1984). A distinction was made between *Duchenne* laughs and smiles, which involve the orbicularis occuli muscles surrounding the eyes, and non-Duchenne laughs and smiles, which do not involve this muscle action (Frank et al., 1993). For a more detailed explication of the facial coding, see Bonanno and Keltner (1997).

At the completion of the interview task, participants were asked to rate ''how often'' (0 = ''not at all'' to 3 = ''almost constantly'') they had experienced interest, enjoyment, anger, and distress. Because sadness is often the crucial emotion in the experience of distress (Ekman & Friesen, 1975; Izard, 1977, 1993; Stearns, 1993), particularly in the context of interrupted or lost attachments (Bowlby, 1980; Parkes & Weiss, 1983), we considered self-reported distress an adequate corollary to sadness.

RESULTS

Does facial expression associate with emotion-specific appraisal? As a first assessment of event-response coherence, we examined correlations between the facial expression, and appraisal measures of emotion (see Table 1). At this more general level of analysis, facial expressions of sadness and anger were significantly correlated with the theorised appraisal themes (i.e., loss, injustice) but not with the other appraisal themes. Non-Duchenne smiles correlated marginally with happiness and, surprisingly, Duchenne smiles were only mildly and nonsignificantly correlated with happiness. Duchenne laughter did not correlate with appraisals of happiness or pride, but was significantly correlated with appraisals of injustice. We consider this latter, somewhat counterintuitive finding further below.

To examine ''on-line'' event-response coherence, we conducted a series of 2 × 2 contingency analyses that paired the presence/absence of each of the four appraisal

TABLE 1
Correlations between emotion measures

	Facial expression				
	Sad	*Anger*	*Duchenne smile*	*Duchenne laugh*	*Non-Duchenne smile*
Appraisal theme					
Loss	*.33**	.14	−.13	−.16	−.32*
Injustice	−.05	*.35**	−.08	*.38**	−.06
Happiness	.23	−.01	*.15*	−.03	.27^{+}
Pride	.12	−.05	*−.13*	.09	.01
Self-reported emotion					
Distress (sad)	*.25*$^{+}$	.21	−.44**	−.25^{+}	−.23
Anger	.21	*.44***	−.29^{+}	*−.51****	−.13
Joy	−.06	−.21	*.24*$^{+}$	.14	−.26^{+}

Note: Italics indicate predicted correlation.
$^{+}p < .10$; $*p < .05$; $**p < .01$; $***p < .001$.

themes with the presence/absence of the different facial expressions of emotion within the same NUs. These analyses are summarised in Table 2. Because the data were independent emotion events stratified within participants, a Mantel-Haenszel test was used. Consistent with predictions, significant on-line contingency was evidenced between facial expressions of emotion and appraisal themes for both sadness, $\chi^2(1) = 23.68$, $p < .001$, and anger, $\chi^2(1) = 6.32$, $p < .05$. Mantel-Haenszel common odds ratios indicated that facial expressions of sadness were 6.93 times as likely to occur during narrative units in which loss appraisals were present, and that facial expressions of anger were 2.81 times as likely to occur during narrative units in which injustice appraisals were present. Facial expressions of anger and sadness occurred at chance frequency with all other emotion themes ($p > .05$). Significant contingency relationships were also evidenced between Duchenne smiles and appraisals of pride, $\chi^2(1) = 8.90$, $p < .01$, and between Duchenne laughter and appraisals of injustice, $\chi^2(1) = 18.66$, $p < .05$. Duchenne smiles were 2.67 times as likely to occur during narrative units in which pride appraisals were present, and Duchenne laughter was 6.67 times as likely to occur during narrative units in which injustice appraisals were present. Duchenne laughs and smiles occurred at chance frequency with all other emotion themes ($p > .05$).

Does facial expression correlate with emotion-specific experience? We first addressed whether reported distress might be an appropriate proxy for reported sadness. The correlations between this emotion and emotion-specific appraisal themes suggest that in the bereavement context, distress maps on to sadness: Reported distress correlated positively with verbal discourse about loss ($r = .52$, $p < .001$) but not with any of the other appraisal themes. Self-reported anger correlated positively with verbal discourse about injustice ($r = .34$, $p < .05$), but not with the other themes.

Table 1 presents the correlations relevant to whether facial expression showed between system coherence. Consistent with our hypotheses, facial expressions of anger correlated with self-reports of anger and facial expressions of sadness correlated marginally with reports of distress. One also sees that Duchenne smiles were correlated with reduced reports

TABLE 2
Percentage of facial expressions of emotion occurring with and without emotion-relevant appraisal themes

		Loss		*Injustice*		*Happy*		*Pride*	
Facial expression		*no*	*yes*	*no*	*yes*	*no*	*yes*	*no*	*yes*
Sadness	Yes	11.7	**47.8**	12.5	11.3	12.6	9.4	12.0	17.9
Anger	Yes	7.4	13.0	6.9	**17.0**	8.8	8.9	7.2	8.9
Duchenne laugh	Yes	2.6	0.0	2.0	**13.2**	3.7	0.0	2.6	2.2
Duchenne smile	Yes	7.8	0.9	**8.0**	0.0	7.5	12.5	6.8	**15.8**
Non-Duch. smile	Yes	23.9	8.7	23.7	22.6	23.3	34.4	22.9	31.4

Note: Each combination of a facial expression of emotion and emotion-relevant appraisal theme represent independent contingency analyses. Boxed cells indicate frequencies statistically significantly greater than chance ($p < .05$).

of distress and marginally with reduced reports of anger, and that Duchenne laughter correlated with reduced reports of anger and marginally with reduced distress.

A final set of analyses examined a further aspect of coherence, embodied in the assumption that emotional experience is elevated when multiple emotion-response systems operate concurrently. We first conducted a MANOVA that compared the three self-reported emotions (distress, anger, joy) among participants who had simultaneously evidenced sadness in the face and appraisal (i.e., event-response coherence), participants who exhibited sadness in either the face or appraisal but not simultaneously, and participants who showed no indication of sadness (see Table 3). This MANOVA was significant, $F(8, 52) = 2.15$, $p < .05$. As predicted, univariate ANOVAs were significant only for self-reported distress, $F(2, 28) = 5.43$, $p < .01$. Student-Newman-Keuls (SNK) tests, which account for multiple comparisons of means at the $p < .05$ level, indicated that participants who showed event-response coherence for sadness reported significantly more distress ($N = 8$; $M = 2.13$, $SD = 0.83$) than participants who evidenced sadness in the face or appraisal but not simultaneously ($N = 16$; $M = 1.06$, $SD = 0.77$) and participants who showed no indicators of sadness ($N = 7$; $M = 1.43$, $SD = 0.53$).

A similar MANOVA for anger was significant, $F(6, 52) = 3.43$, $p < .01$, and univariate ANOVAs were significant only for self-reported anger, $F(2, 28) = 6.54$, $p < .01$. SNK tests showed that participants who showed event-response coherence for anger reported significantly more anger ($N = 11$, $M = 1.18$, $SD = 0.87$) than participants who showed anger in the face or appraisal but not simultaneously ($N = 14$, $M = 0.21$, $SD = 0.58$) and

TABLE 3
Self-reported emotion for participants who did and did not show event-response coherence for target emotion, or did not show target emotion

Self-reported emotion	*Sad face with sad appraisal* ($n = 8$)	*Sad face or sad appraisal* ($n = 16$)	*No sadness* ($n = 7$)	$F(2, 28)$
Distress (sad)	$2.13\ (0.83)_a$	$1.06\ (0.77)_b$	$1.43\ (0.53)_b$	5.43**
Anger	1.00 (0.93)	0.38 (0.81)	0.57 (0.53)	1.67
Joy	1.50 (0.53)	1.88 (1.09)	1.14 (1.07)	1.45
Self-reported emotion	*Anger face with anger appraisal* ($n = 11$)	*Anger face or anger appraisal* ($n = 14$)	*No anger* ($n = 6$)	$F(2, 28)$
Distress (sad)	1.36 (0.81)	1.71 (0.83)	0.83 (0.75)	2.54
Anger	$1.18\ (0.87)_a$	$0.21\ (0.58)_b$	$0.33\ (0.52)_b$	6.54**
Joy	1.09 (0.83)	1.92 (0.92)	1.83 (1.16)	2.66
Self-reported emotion	*Smile with positive appraisal* ($n = 12$)	*Smile of positive appraisal* ($n = 19$)		$t(29)$
Distress (sad)	0.73 (0.79)	1.74 (0.92)		2.94**
Anger	0.42 (0.90)	0.68 (0.75)		0.89
Joy	1.66 (1.15)	1.58 (0.90)		0.24

Note: Cells with different subscripts differ significantly based on Student-Newman-Keuls test of multiple comparisons ($p < .05$). NU = Narrative Unit. ** $p < .01$.

participants who showed no indicators of anger (N = 6, M = 0.33, SD = 0.52. A MANOVA compared self-reported emotions among participants who smiled concurrently with any positive appraisal versus participants who smiled or described positive appraisals in separate NUs. This analysis was marginally significant, $F(4, 26) = 2.16$, p = .10. Follow-up t-tests (see Table 3) indicated that participants who smiled concurrently with positive appraisals reported significantly less distress (N = 12, M = 0.73, SD = 0.79) than participants who smiled or described positive appraisals separately (N = 19, M = 1.74, SD = 0.92), $t(29) = 2.94$, $p < .01$. A MANOVA comparing participants who laughed during NUs that included an anger appraisal, participants who laughed or described anger themes independently, or participants who did not show laugher or anger themes did not approach significance, $F(8, 52) = 0.45$, p = .88. A similar analysis comparing participants who smiled in NUs with the theme of pride, and participants who smiled or described pride, but not simultaneously also failed to approach significance, $F(4, 25) = 1.14$, p = .25.

DISCUSSION

In the present study, we examined evidence relevant to two questions: Are facial expressions of emotion associated with emotion-related appraisal (event-response coherence)? And are facial expressions of emotion linked to other emotion-related responses in systematic ways (between-system coherence)?

Event response coherence: Meaning and facial expression. The assumption that facial expressions of emotion are associated with emotion-specific appraisals, central to theories of appraisal (Lazarus, 1991; Roseman & Smith, 2001; Smith & Kirby, 2000) and facial expression (e.g., Ekman, 1992) alike, has received surprisingly little attention. Scholars have questioned the assumption that facial expression directly correspond to the meaning of the eliciting event. (e.g., Fernández-Dols et al., 1997; Russell, 1994).

Our findings indicate that facial expressions of emotion correspond to emotion-related appraisals. Facial expressions of sadness and anger occurred more frequently during portions of on-line discourse when participants spoke of loss and injustice respectively, and not when discussing other emotion-related themes. Duchenne smiles, thought to be a marker of many positive states (e.g., Ekman, 1993), did not correlate with the overall frequency of positive appraisals and failed to show the predicted contingency with happiness-related appraisals, but did co-occur with pride-related appraisals. Duchenne laughter occurred significantly more often when participants spoke of injustice, as predicted by the hypothesis that laughter accompanies the reduction or undoing of negative emotion, and in particular, anger (e.g., Fredrickson, 1998; Keltner & Bonanno, 1997; Levenson, 1988; Tomkins, 1962).

These are the first findings we know of to link facial expressions of emotion to specific, on-line measures of appraisal, and as such provide important encoding evidence for anger and sadness expressions. The rather specific associations between appraisal themes and emotional expression and experience also attest to the benefits of narrative analysis, which represent a promising approach for further study of ''on-line'' emotion-related appraisal (Bonanno et al., 1999).

Between-systems coherence: Facial expression and emotional experience. The issue of whether emotion-related responses are intercorrelated has often attracted more

theoretical controversy than empirical attention. The present study offered two windows into the nature of between-system coherence of emotional response. First, the measures of appraisal, expression, and experience were correlated for sadness, anger, and to a lesser extent, smiling and laughter. Importantly, sadness- and anger-related measures correlated only within but not between these emotions. Thus, these emotional responses were both coherent and distinct.

Second, comparisons of the ''on-line'' narrative and facial data with participant's self-reports confirmed the hypothesis that coherence amongst systems relates to the stronger experience of emotion. This result was observed primarily for sadness and anger, which is especially impressive in the light of the rather crude approach we took to the measurement of emotional experience (i.e., distress was used for sadness, and only one self-report item was used to measure each emotion). This evidence is consistent with the very nature of arguments about coherence: individuals are more likely to report an emotion, and theorists more likely to claim that it occurred, to the extent that many of its indicators co-occur (Ekman, 1993).

Limitations and implications. The present study suffered from several limitations, which highlight the need for further research. The self-report measures of positive emotion were imprecise, and may have accounted for the little between-system coherence we observed with the positive emotions. It will be important to assess the coherence of facial expression in different expressive contexts. It is interesting to note that the in the context of a bereavement interview, event-response coherence was strongest for sadness, and weaker for anger, smiling, and laughter. Bereavement is perhaps best defined by loss and sadness. Our participants may have felt certain reservations about expressing other emotions, in particular anger, in the light of cultural norms about appropriate expressions of grief (Averill & Nunley, 1993; Rosenblatt, 1993). Hence, the coherence of emotion may be greatest in circumstances in which certain emotions are expected according to cultural norms.

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APPENDIX
Relevant emotion, theme, appraisal components, and examples for four core relational themes

Emotion	*Theme*	*Additional appraisal components*	*Examples*
Anger	A demeaning offence (injustice)	1. Harm to self- or social-esteem 2. Blame to another person	''He lied about his health. I really felt he cheated when he died on me''
Sadness	Having experienced an irrevocable loss	1. Loss of something valued 2. Blame is not indicated 3. Loss is not likely to be restored or compensated for	''That's part of the pain of having him gone is when somebody loves you that intensely and they're gone. It's like part of me is gone''
Happiness	Making reasonable progress toward the realisation of a goal	1. Future expectations are favourable	''Things were really good. We had a good life. Everything worked well''
Pride	Enhancement of ego-identity by taking credit for a valued object or achievement	1. Enhancement of self-or social-esteem 2. Credit is to oneself	''I learned to be my own person again. I became independent again''