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Arousing Primary Vulnerable Emotions in the Context of Unresolved Anger: "Speaking About" Versus "Speaking To"

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Arousing and processing primary vulnerable emotions is a core change mechanism across a wide range of psychotherapies and clinical populations. This study examined the utility of 2 emotion-focused interventions—relational reframes and empty-chair enactments—in terms of arousing primary sadness associated with loss and longing among individuals suffering from unresolved anger. Twenty-nine women reporting unresolved anger underwent a single, analogue emotion-focused therapy session comprised of empathy, relational reframe, and empty-chair interventions. The arousal of sadness was measured with voice signal, voice quality, and speech fluency measures. Results indicated that both relational reframe and empty-chair interventions led to increased arousal of sadness relative to baseline nonemotional speech. Empty-chair interventions also led to increases in fear/anxiety, presumably due to the potential for rejection or attack by the significant other (i.e., attachment figure). Treatment implications are discussed.

Keywords: anger, sadness, enactment, voice analysis

Processing avoided or blocked off emotions is a purported change mechanism in a wide variety of psychotherapies (Engle, Beutler, & Daldrup, 1991; Fosha, 2000; Greenberg & Pascual-Leone, 2006; Safran & Greenberg, 1991). In the context of cognitive behavior therapy, for example, emotional processing is thought to occur when dysfunctional or symptomatic anxiety/fear is faced rather than avoided. According to this view, two conditions must be met. First, clients must be exposed to the anxiety- or fear-producing memories or stimuli, activating pathological fear structures or schema. Second, new corrective information (i.e., evidence that the situation, thoughts, or feelings are, in fact, not dangerous) leads to the formation of more accurate cognitive schema, which in turn results in more adaptive affective and behavioral responses, including the reduction of fear and avoidance (Foa, Huppert, & Cahill, 2006; Foa & Kozak, 1986). Indeed, a number of studies have found that emotional arousal during the course of exposure therapy was related to treatment outcome across a number of disorders, including posttraumatic stress disorder and obsessive–compulsive disorder (Foa, Riggs, Massie, & Yarczower, 1995; Gilboa-Schechtman & Foa, 2001; Jaycox, Foa, & Morral, 1998; Kozak, Foa, & Steketee, 1988; Paivio, Hall, Holowaty, Jellis, & Tran, 2001).

From an experiential perspective, emotional processing is conceived of as accessing, fully experiencing, and making new meaning of avoided emotions (Greenberg, 2002; Greenberg & Pascual-Leone, 2006). When primary (i.e., authentic, immediate) emotional experiences are inhibited or avoided, individuals are deprived of potentially adaptive information, leaving them psychologically and/or emotionally stuck. On the other hand, helping clients to overcome avoidance by arousing and having them express emergent, previously suppressed primary emotions and attendant interpersonal needs serves to restructure self–other schemas and promote adaptive behavioral responses (Greenberg & Malcolm, 2002). For example, people suffering from secondary, defensive, unresolved anger toward an attachment figure may be terrified by, and consequently avoid, accessing, experiencing, and expressing their underlying sense of worthlessness, loss, longing, and sadness. Accessing such feelings, however, is likely to help the individual symbolize these feelings with words, facilitating the articulation of underlying attachment needs—including the need for love, intimacy, and appreciation—and putting the person in a better position to meet those needs. Moreover, once such feelings are experienced as tolerable, then the need to defend against them is diminished and, thus, secondary anger is reduced.

Research on experiential therapy has shown that in-session arousal of primary emotions is related to outcome. For example, two studies examining the process of resolving unresolved business showed that resolvers were more likely to evidence moderately high levels of in-session arousal of productive, primary emotions (Bridges, 2006; Greenberg & Malcolm, 2002). In another study, examining the process of change among depressed clients, levels of midtreatment emotional arousal predicted lower posttreatment symptom levels (Missirlian, Toukmanian, Warwar, & Greenberg, 2005). More recently, Carryer and Greenberg (2010) found that an optimal frequency (25% of the time) of high arousal was associated with good outcome. Arousal of primary emotions has been most strongly correlated with outcome when it occurs in conjunction with cognitive exploration and reflection (i.e., high

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levels of experiencing; Missirlian et al., 2005; Pos, Greenberg, Goldman, & Korman, 2003). Although questions still remain regarding the optimal range and frequency of emotional arousal required to facilitate productive processing (Wiser & Arnow, 2001), and under what conditions arousal should be encouraged (Kennedy-Moore & Watson, 2001), it is clear that clients must first approach and engage in their feared, avoided primary emotions before they can begin to understand and be guided by them.

Despite evidence suggesting the clinical utility of arousing avoided, primary, adaptive emotions in the context of experiential therapy, there has been little empirical research on exactly how to arouse such emotions. This study examined the impact of two interventions designed to arouse primary hurt and sadness in the treatment of secondary, defensive, unresolved anger. The first intervention, the relational reframe, was derived from attachment-based family therapy (Diamond, 2005). The goal of the intervention is to redirect the focus of the session away from intrapersonal, blaming attributions toward the other (e.g., "I hate her," "She is selfish") and onto the interpersonal loss and sadness caused by the relational rupture (Diamond & Siqueland, 1998; Moran, Diamond, & Diamond, 2005). For example, after listening to a young man speak about how his best friend had betrayed him, the therapist might remark, "I can see that you are furious with your friend. I wonder if, alongside your anger, you also miss what you two once had together?" Typically, such interventions lead to a dramatic shift in affect, eliciting unmet attachment needs and the primary pain and sadness underlying the unresolved anger, making such emotions available for reprocessing.

The second intervention, the empty-chair intervention, is derived from gestalt therapy (Perls, Hefferline, & Goodman, 1965). Empty-chair episodes or enactments are, in fact, a type of imaginal exposure. Clients are asked to imagine that the significant other is actually sitting in an empty chair across from them and are then encouraged to express their pain and unmet needs directly and in the first person—to talk to the significant other. In the context of unresolved anger, this might involve having the client say something to the effect of, "I wished you cared about being with me as much as I care about being with you." To do this, clients have to face and overcome their anxiety about whether their needs, and their pain associated with not having their needs met, are legitimate (Greenberg & Paivio, 1997). The use of psychodramatic enactments, especially chair dialogues, is a central technique for evoking emotions in emotion-focused and experiential therapies (Greenberg & Watson, 2006) and has been linked with higher levels of experiencing in case studies (Watson, Goldman, & Greenberg, 2007). Indeed, our clinical experience suggests that such enactments are exceptionally arousing. Not only do they involve having clients access, in vivo, their unmet attachment needs and vulnerability, but they also arouse, and help clients face, their fear that the significant other will respond with indifference, rejection, or even retribution to their expression of need. Thus, such enactments are characterized not only by intense hurt, longing, and sadness, but also by anxiety about the possibility of reexperiencing disappointment or rejection. Over time the anxiety diminishes and the legitimacy of the previously disallowed need is reclaimed.

To our knowledge, this is the first study to examine the efficacy of two different interventions designed to arouse primary, vulnerable emotions in the context of psychotherapy. Examining these two specific interventions is made more interesting by the fact that one of the interventions, relational reframe, involves talking *about* one's experience of such feelings whereas the other intervention, empty-chair enactment, involves expressing such feelings directly *to* the significant other, as if he/she were sitting in the room.

In order to obtain objective measures that reflect emotional arousal, we analyzed various acoustic parameters. Acoustic analysis of speech and voice has been used in previous research to gauge the arousal of, and distinguish between, a variety of emotional experiences (Bachorowski & Owren, 1995; Hammerschmidt & Jurgens, 2007; Juslin & Laukka, 2001; see Scherer, Johnstone, & Klasmeyer, 2003, for a review), including emotional experiences occurring in therapy-like situations (Rochman, Diamond, & Amir, 2008).

The most commonly examined emotion-sensitive vocal acoustical parameters studied include (a) mean fundamental frequency (mF0), which represents the rate of vibration of the vocal folds during phonation and speech and is subjectively perceived as the speaker's pitch; (b) F0 range, which represents the dynamic range of the fundamental frequency within a speech segment and is perceived as the patient's pitch range; (c) amplitude range, which represents the range of intensity levels within the speech segment and is perceived as loudness variability; and (d) amplitude-perturbation and pitch-perturbation parameters, which capture imperceptible fluctuations in the intensity and F0 production, respectively, and are typically described as changes related to voice quality that increase with decreases in the neurological control over the voice production system. In this study we also included an additional measure, the noise-to-harmonics ratio (NHR), to obtain a more complete description of participants' voice quality. One advantage of measuring NHR is that, unlike amplitude perturbation and pitch perturbation, NHR is commonly viewed as a perceptual correlate of the degree of "breathiness" or "hoarseness" of the speaker's voice. Finally, we included two additional measures—speech rate (words per second [WPS] and syllables per second [SPS]) and a measure of voicing continuity, or degree of voicing (Vdeg)—which have previously been examined in relation to various emotional states (Laukka et al., 2008; Scherer, Banse, Wallbott, & Goldbeck, 1991; Whiteside, 1999). All in all, we included three types of acoustic measures: the first representing features of overall vocal dynamics, which can be perceived as related to speech prosody (i.e., mF0, F0 range, and amplitude range); the second representing vocal signal stability, which can be understood as related to voice quality (i.e., amplitude perturbation, pitch perturbation, and NHR); and the third representing speech and voice flow/continuity measures, including speech rate (i.e., WPS, SPS) and voicing continuity (i.e., Vdeg).

Prior literature has indicated that values of mF0, F0 range, and amplitude range tend to decrease during sadness, relative to nonemotional speech (Scherer et al., 2003; see Juslin & Laukka, 2003, for a review). Additionally, voice-quality-related measures have been found to increase (Juslin & Laukka, 2001; Rochman et al., 2008) and speech rate and/or fluency to decrease (Bartolic, Basso, Schefft, Glauser, & Titanic-Schefft, 1999; Scherer et al., 1991) during expressions of sadness in comparison to nonemotional speech. We expected—on the basis of these prior findings and the assumption that sadness would increase during relational reframe interventions in comparison to baseline, nonemotional speech—to find decreases in mF0, F0 range, amplitude range, SPS, and WPS

and increases in the pitch-perturbation quotient (PPQ, which represents the amount of cycle-to-cycle instability in the F0 with a smoothing factor of five vocal cycles), the amplitude-perturbation quotient (APQ, which represents the amount of cycle-to-cycle instability in the amplitude with a smoothing factor of five vocal cycles), NHR, and Vdeg during relational reframe interventions in relation to baseline.

Moreover, we expected, on the basis of the assumption that empty-chair enactments would further facilitate the accessing and expression of sadness (in this study, empty-chair enactments were always introduced subsequent to relational reframe interventions), that SPS and WPS would decrease and PPQ, APQ, NHR, and Vdeg would increase relative to baseline and relative to the immediately preceding relational reframe interventions. Because we also assumed that empty-chair enactments would elicit fear/anxiety associated with potential disappointment from/rejection by the attachment figure, we hypothesized that mF0, F0 range, and amplitude range would increase from relational reframe to empty-chair enactments. This is because fear/anxiety activates the sympathetic branch of the nervous system, leading to increases in the levels of tension of the muscles supporting the production of voice sounds, which then manifest as increases in mF0, F0 range, and amplitude range (i.e., perceptually, increases in pitch, pitch variability, and loudness variability; Titze, 2000). Indeed, mF0 and F0 range have been shown to be particularly sensitive to states of fear/anxiety in prior research (Juslin & Laukka, 2001; Laukka et al., 2008).

Method

Participants

Participants included 29 female undergraduate students suffering from unresolved anger. Participants were drawn from a group of 70 women who had taken part in a larger study on unresolved anger (see the Sampling Procedure section). All participants were first-year, undergraduate students between 21 and 26 years of age ($M = 22.8$, $SD = 1$) who reported persistent unresolved anger toward an attachment figure (i.e., a parent, sibling, past or current romantic partner, or past or current longtime friend). All 70 participants had been recruited via signs posted at a large Israeli university and two area colleges. The signs had read as follows: *We are looking for people with persistent feelings of anger toward a significant person in their lives. In order to participate, your anger must be intense, aroused when you think or talk about the other person, and be bothersome to you.* Participants were included in the sample if (a) their feelings of anger had been experienced for at least the past 6 months, (b) their anger was directed toward a significant other (e.g., parent, sibling, romantic partner, good friend), and (c) their anger was intrusive and intense enough to interfere with their daily lives. Candidates under the influence of drugs that affect the functioning of the autonomic nervous system (e.g., psychoactive drugs, asthma medicine) or who were pregnant were excluded. All 70 participants were informed that the study involved speaking with somebody for between 30 and 45 min about their feelings of anger and sadness. They were also informed that the interview would be audio- and videotaped and were asked to complete a consent form. A total of three candidates answering the advertisement were excluded. Two were excluded because their anger was toward somebody other than an attachment figure (e.g., employer) and one because she reported that her anger did not bother her on a regular basis.

Analogue Therapy Session

Once participants signed the consent form, they were seated in a therapy room and fitted with a headset with a fixed microphone attached. The therapist then sat in a chair across from the participant and initiated the baseline stage of the session. During the baseline stage, the participant was asked questions about ordinary, day-to-day topics (i.e., "What classes are you taking?" "What do you like to do with your free time?" and so forth). The purpose of the baseline stage was twofold. First, it served to help the therapist join with the participant and help her to feel comfortable (i.e., reduce anxiety). Second, it allowed for the gathering of acoustical measures during an emotionally neutral state. The baseline stage lasted for approximately 5 min.

Following the baseline stage, the therapist initiated a sequence of three interventions: empathy, relational reframe, and empty-chair enactment. This sequence was designed to first evoke the participant's experience and expression of unresolved anger (during the empathy stage) and then shift the participant's attention from a focus on anger and resentment to a focus on the underlying loss, sadness, and vulnerability thought to fuel such anger (during the relational reframe stage; Diamond & Siqueland, 1998). Finally, during the empty-chair stage, participants were asked to imagine that the significant other was sitting in an empty chair across from her and to express her feelings of loss, sadness, and vulnerability directly to the other, in the first person (Elliott, Watson, Goldman, & Greenberg, 2004).

To initiate the empathy stage, the interviewer elicited, empathized with, and validated the participant's experience of unresolved anger. The therapist asked questions such as, "What are you so angry at your mother about?" and followed with comments such as, "I can see why you might be furious." The use of empathy served to both build a trusting relationship between the participant and the therapist and ensure that the participant remained focused on the experience of her unresolved anger for a sustained period of time (at least 2 min). The next stage, the relational reframe stage, began when the interviewer delivered the first relational reframe intervention. As mentioned earlier, relational reframes are interventions designed to shift clients' attention and experience from angry, blaming attributions to the loss and pain associated with ruptured attachment relationships. For example, the interviewer might say, "It sounds like you have been furious with your father for years. I wonder if some place inside, you also miss him and wish the relationship were better and that the two of you were closer." The third and final part of the session was the empty-chair stage. This stage began when the therapist asked the participant to imagine her significant other (i.e., mother, father, sister, or other attachment figure) sitting across from her and to express her vulnerable emotions—including sadness, loss, and longing—directly to the significant other, in the first person (e.g., Elliott et al., 2004; Greenberg, Rice, & Elliott, 1993; Perls et al., 1965).

Therapists decided when to transition from stage to stage of the session according to both standardized guidelines and their clinical judgment. On one hand, each stage was required to last between 5 and 10 min. On the other hand, therapists used their clinical

judgment to decide whether the participant had sufficiently performed the task associated with the given stage (e.g., had spoken about loss during the relational reframe stage or expressed loss, sadness, or longing directly in the first person during the empty-chair stage) before beginning the next task.

Therapists

The analogue therapy sessions were conducted by six female advanced clinical psychology interns (i.e., between 26 and 34 years of age), each with 2 to 4 years of post-master's clinical training. The therapists were taught and trained to deliver experiential, emotion-focused interventions by an expert in attachment-based family therapy. The expert trainer observed the videotaped analogue sessions to ensure that all six therapists conducted the sessions in adherence to the treatment protocol. Therapists were naïve to the purpose and hypotheses of the study.

Sampling Procedure

A set of three trained coders rated the videotaped session from all 70 cases. Coders were instructed to select those cases in which participants (a) expressed loss and pain regarding the rupture in their relationship with the significant other during both the relational reframe and empty chair stages, (b) spoke about their loss and pain in the first person during the empty-chair stage, and (c) produced at least seven on-task sentences of speech during both the relational reframe and empty-chair sessions. The criteria of seven sentences minimum was chosen because we have found that at least three sentences of speech are necessary for emergent emotions to be sufficiently formed, and four additional sentences are required to generate a sufficiently large sample of utterances for analyses (for more detailed information about acoustical units of analyses, see the Unit of Analysis and Data Reduction subsection under Results). Coders were undergraduates who were naïve to the purpose and hypotheses of the study.

Coder Training, Coding Procedure, and Reliability Estimates

Coders were first trained to identify facial expressions of sadness/pain, anger, and neutral states using both the Karolinska Directed Emotional Faces (KDEF; Lundqvist, Flykt, & Öhman, 1998) database and the Facial Action Coding System (FACS; Ekman, Friesen, & Hager, 2002). They were then given examples of clients' narratives reflecting sadness and longing drawn from prior studies.

After completing the training, all three coders rated 10 of the 70 cases to determine whether each case met all inclusion criteria. Coders obtained 100% exact agreement on these 10 cases (five met criteria, and five did not). Consequently, videotapes of the remaining 60 cases were assigned to coders in a rotating randomized pair procedure, with each tape rated by two coders. A total of 29 of the 70 cases were deemed to have met all study inclusion criteria. Coders reached absolute agreement on 78% of the tapes, and interrater analysis produced a kappa of .59 ($SE = .11$; $p < .001$). This measure of agreement is generally considered moderate (Landis & Koch, 1977). In those instances in which the two coders did not agree, the third coder rated the tape to determine the final status of the case.

The remaining 41 individuals who had participated in the larger study were not included in this secondary analysis for one of two reasons: (a) They did not express feelings of pain and loss in the first person during the empty-chair interventions ($n = 30$) or (b) they performed the task but produced less than the required minimum of seven sentences ($n = 11$). A chi-square analysis indicated that the distribution of therapists in the subsample of 29 was not different from that for the full sample of 70, $\chi^2(5, N = 70) = 3.72$, ns.

Results

Unit of Analysis and Data Reduction

Average baseline ratings were derived by analyzing the last minute of the baseline stage from each session. The last minute of the baseline stage was chosen because participants had already overcome much of the anxiety associated with the experimental environment, and thus these readings were considered most representative of emotionally neutral speech. In order to measure the effect of the relational reframe, the following procedure was employed. First, the therapists' last attempt to initiate the relational reframe (e.g., have the participant talk about relational topics such as hurt, loneliness, or a desire to improve the relationship) was identified. The last attempt was chosen under the assumption that therapists would continue to employ such interventions until they were successful. After identifying the last relational reframe, the participant's fourth subsequent sentence was chosen as the beginning point of the segment to be analyzed. The same procedure was used to identify segments reflecting the effect of empty-chair interventions. Segments analyzed were all approximately 1 min in length.

Prior to performing acoustical analyses, speech segments were divided into utterances. For this purpose, an utterance was defined as a string of words that (a) communicate an idea, (b) are bounded by a simple intonation contour, (c) are grammatically acceptable, and (d) contain at least three consecutive words or five syllables (Hall, Amir, & Yairi, 1999). Within each stage (i.e., baseline, relational reframe, and empty-chair enactment), an average of 25.5 ($SD = 10.6$) utterances were submitted to computerized acoustical analysis. A total of 2,209 utterances were analyzed in this study.

Data Analytic Strategy

Values for mF0, F0 range, and amplitude range were calculated for each voice signal (i.e., utterance) with the aid of Praat software (Version 4.1.2; Boersma & Weenink, 2003). Values for mF0 were calculated for the entire utterance, after manual correction of octave errors, and values for F0 range and amplitude range were calculated by subtracting the voice signal's lowest from highest F0 and amplitude values, respectively (see Rochman et al., 2008, for more information). The PPQ and the APQ were calculated with the aid of the Multidimensional Voice Program (MDVP; Model 5105, Version 2.1). For a more detailed explanation regarding these measures and their calculation procedures, see the supplemental material found in Rochman et al. (2008). In addition, with the aid of the MDVP, the NHR was calculated as the proportion of the

energy corresponding to the nonharmonic components of the voice signal, relative to that of the harmonic component.

Speaking rate measures (WPS and SPS) were calculated as the number of spoken units (i.e., words and syllables, respectively) per unit of time across continuous segments of speech that included pauses, disruption, and dysfluency (Howell, Au-Yeung, & Pilgrim, 1999). Finally, Vdeg, the voicing-continuity measure, was calculated as the percentage of time during which no voicing was identified within a given utterance.

Analyses were conducted on the mean value for each measure across utterances produced by each individual participant within each stage (baseline, relational reframe, and empty-chair enactment).

Main Analysis

Table 1 presents the intercorrelations between the nine dependent measures. As would be expected, the correlation between SPS and WPS and the intercorrelations between Vdeg, PPQ, APQ, and NHR were large (i.e., greater than .5; Cohen, 1988). The positive correlation between mF0 and F0 range and the negative correlation between mF0 and amplitude range were medium-sized (i.e., between .3 and .5; Cohen, 1988). The positive correlations between SPS and amplitude range and between SPS and APQ and the negative correlation between APQ and mF0 were small (i.e., lower than .3; Cohen, 1988). Table 2 presents mean values and standard deviations for each dependent measure during the baseline, relational reframe, and empty-chair stages of the analogue therapy sessions.

A multivariate analysis of variance (MANOVA) with stage of the session (i.e., baseline, relational reframe, empty-chair enactment) serving as the independent repeated measure and vocal acoustical parameters (i.e., SPS, WPS, amplitude range, F0 range, mF0, Vdeg, PPQ, APQ, and NHR) serving as dependent measures was conducted to determine whether participants' vocal acoustical profiles varied across baseline, relational reframe, and empty-chair enactment. The Wilks's lambda multivariate test revealed a main effect for stage, $F(18, 11) = 16.68$, $p < .001$, $\eta_p^2 = .97$, suggesting that participants' vocal acoustical profiles varied according to the stage of the session.[1]

Nine follow-up analyses of variance (ANOVAs) were conducted—one for each dependent measure (i.e., SPS, WPS, amplitude range, F0 range, mF0, Vdeg, PPQ, APQ, and NHR), with the stage of the session (i.e., baseline, relational reframe, empty-chair enactment) serving as the independent repeated measure—to examine the nature of participants' vocal acoustical variability at the level of each vocal acoustical parameter. Employing a Bonferroni adjustment, levels of significance for p values were set at $<.006$ (.05 divided by nine ANOVAs) to account for the inflated possibility of Type I error. Eight out of the nine ANOVAs (i.e., all ANOVAs with the exception of amplitude range) yielded a significant effect for stage of session. Each of the eight significant univariate effects were probed by conducting planned contrasts between the baseline, relational reframe, and empty-chair mean values, in accordance with the study hypotheses. Five dependent measures significantly changed from baseline to relational reframe in the expected direction. Specifically, three vocal-quality-related measures (i.e., PPQ, APQ, and NHR) and the voice-continuity measure (i.e., Vdeg) increased, and one of the speech rate measures (i.e., SPS) decreased from baseline to relational reframe. No other dependent measure significantly changed from baseline to relational reframe.

Seven dependent measures (mF0, F0 range, PPQ, NHR, SPS, WPS, and Vdeg) significantly changed from relational reframe to empty-chair enactment. Specifically, mF0, F0 range, SPS, and WPS increased from relational reframe to empty-chair enactment, as expected, whereas PPQ, NHR, and Vdeg decreased from relational reframe to empty-chair enactment, contrary to our predictions. No other dependent measure significantly changed from relational reframe to empty-chair enactment.

Additionally, seven dependent measures (i.e., mF0, F0 range, PPQ, APQ, NHR, WPS, and Vdeg) significantly increased from baseline to empty-chair enactment. The increases in mF0, F0 range, PPQ, APQ, NHR, and Vdeg were expected, whereas the increase in WPS was contrary to our predictions. No other dependent measures significantly changed from baseline to empty-chair enactment. Results for the univariate analyses (i.e., F and partial eta-square values), as well as between-stage comparisons, are presented in Table 2.

Considering the Role of Time

These results suggest that from the relational reframe to the empty-chair stage, participants' vocal acoustical profiles changed in a manner that reflected increases in anxiety and decreases in sadness. Increases in anxiety were reflected by increases on measures of overall voice dynamics (mF0 and F0 range) and speech rate (SPS and WPS). Decreases in sadness were reflected by decreases in two of the vocal-quality-related measures (i.e., PPQ and NHR) and the voice-continuity measure (Vdeg).

In order to explore whether participants' vocal acoustical profiles changed due to the introduction of the empty-chair intervention rather than simply the passage of time, we calculated correlations between vocal acoustical change (i.e., relational reframe to empty-chair change scores on mF0, F0 range, WPS, SPS, PPQ, NHR, and Vdeg) and time (i.e., seconds elapsed). None of these correlations were significant.

Discussion

Results from this study suggest that relational reframe interventions and imaginal empty-chair enactments both elicited primary sadness, loss, and longing among individuals suffering from secondary, unresolved anger. First, both interventions evoked changes on voice-quality parameters sensitive to the arousal of sadness. Specifically, relational reframes and empty-chair enactments were associated with an increase in voice perturbation for speech con-

[1] In order to identify outliers, we followed the recommendations of Tabachnick and Fidell (2007). First, variables were screened for univariate outliers. We found none. Next, variables were screened for multivariate outliers by computing, for each case, the Mahalanobis distance from the rest of the cases. Three cases showed a Mahalanobis distance larger than the critical value of $\chi^2(8) = 26.13$, $p < .001$. We reran the multivariate analysis without these three outliers, and the results indicated that the MANOVA was still significant, $F(18, 8) = 45.07$, $p < .001$, $\eta_p^2 = .99$. Under these circumstances, and in order to retain the largest possible sample size and external generalizability, we included all 29 cases in subsequent analyses.

Table 1
Intercorrelations Between Acoustical Parameters

Measure	1	2	3	4	5	6	7	8	9
1. mF0	—								
2. F0 range	.40**	—							
3. Amplitude range	−.33**	.16	—						
4. PPQ	−.10	−.12	−.09	—					
5. APQ	−.22*	.05	.06	.80**	—				
6. NHR	−.14	−.03	−.06	.95**	.84**	—			
7. SPS	.08	.09	.23*	−.04	.26*	.03	—		
8. WPS	.13	−.05	.02	.01	.17	.08	.75*	—	
9. Vdeg	−.15	.03	.04	.63**	.53**	.69**	−.08	−.10	—

Note. mF0 = mean fundamental frequency; F0 range = fundamental frequency range; PPQ = pitch-perturbation quotient; APQ = amplitude-perturbation quotient; NHR = noise-to-harmonics ratio; SPS = syllables per second; WPS = words per second; Vdeg = degree of voicing.
* $p < .05$. ** $p < .01$.

veying these negative emotions in comparison to nonemotional speech. Such change reflects a decrease in vocal quality that is typically perceived as breathiness or hoarseness. Emotional states of sadness/vulnerability have been found to evoke decreases in voice-quality-related parameters in prior studies (Juslin & Laukka, 2001; Ozdas, Shiavi, Silverman, Silverman, & Wilkes, 2004; Rochman et al., 2008).

Second, and also reflective of sadness, both interventions led to a decrease in voicing continuity, as reflected in Vdeg. In other words, participants' flow of voice and speech was more interrupted

Table 2
Summary of Results (N = 29)

	Stage			Effect for stage		
Measure	B	RR	ECH	$F(2, 56)$	η_p^2	Significant changes
mF0[a]				11.50***	.29	B < ECH***, RR < ECH**
M	201.77	204.09	213.45			
SD	20.96	21.69	19.71			
F0 range[a]				7.87***	.22	B < ECH**, RR < ECH***
M	112.82	112.28	131.09			
SD	22.42	34.98	31.76			
Amplitude range[b]				1.92	.06	
M	5.14	5.17	4.56			
SD	2.80	3.11	2.34			
PPQ				8.27***	.23	B < RR**, B < ECH*, RR > ECH*
M	1.11	1.36	1.20			
SD	0.38	0.62	0.40			
APQ				5.62**	.17	B < RR*, B < ECH*
M	4.12	4.53	4.38			
SD	0.70	1.10	0.88			
NHR				21.65***	.44	B < RR***, B < ECH***, RR > ECH*
M	0.12	0.16	0.14			
SD	0.04	0.06	0.05			
SPS				8.51***	.23	B > RR***, RR < ECH**
M	5.90	5.43	5.96			
SD	0.67	0.82	0.77			
WPS				7.34***	.21	B < ECH***, RR < ECH**
M	2.81	2.71	3.13			
SD	0.31	0.54	0.47			
Vdeg				22.20***	.44	B < RR***, B < ECH***, RR > ECH*
M	26.97	33.12	30.81			
SD	4.77	6.08	5.57			

Note. B = baseline; RR = relational reframe; ECH = empty-chair enactment; mF0 = mean fundamental frequency; F0 range = fundamental frequency range; PPQ = pitch-perturbation quotient; APQ = amplitude-perturbation quotient; NHR = noise-to-harmonics ratio; SPS = syllables per second; WPS = words per second; Vdeg = degree of voicing.
[a] Expressed in hertz. [b] Expressed in normalized decibels.
* $p < .05$. ** $p < .006$. *** $p < .001$.

during relational reframe and empty-chair interventions than during nonemotional speech. Presumably, talking about painful emotional experiences such as loss and sadness activated affective/experiential configurations that interrupted or interfered with the individuals' capacity to employ speech- and language-related functions. Neurobiological findings suggest that sadness can attenuate activation of language-related, left-hemisphere brain centers (e.g., Baker, Frith, & Dolan, 1997), impairing verbal fluency (Bartolic et al., 1999). This may be the reason that speech rate decreased, as indicated by SPS, during relational reframe interventions, in comparison to nonemotional speech. In therapy, a decrease in clients' verbal fluency is typically perceived by therapists as reflecting a struggle between competing affective–cognitive schemes simultaneously striving for expression (e.g., defensive or avoiding strategies vs. emerging primary emotions) and is seen as an indicator of emotional processing. These findings are particularly important because arousal of primary, productive emotions in the context of emotion-focused therapy has been linked to the amelioration of depressive symptoms and resolution of interpersonal conflict (Greenberg, Auszra, & Hermann, 2007; Pos, Greenberg, & Warwar, 2009).

Whereas the relational reframe and empty-chair interventions both elicited sadness and vulnerability, our findings suggest that the shift from relational reframe to empty-chair enactment also elicited fear/anxiety, perhaps because it involved making oneself vulnerable in the presence of a significant other. Indeed, compared with both baseline (nonemotional) speech and relational reframe interventions, empty-chair enactments evoked higher values of pitch, pitch-variability, and speech-rate measures (represented by mF0, F0 range, and WPS, respectively). During the arousal of fear/anxiety, mF0 and F0-range values increased due to increased muscle tension caused by the activation of the sympathetic branch of the nervous system. Along the same lines, relative to nonemotional speech and relational reframe interventions, empty-chair enactments elicited higher WPS values as a reflection of the need to rapidly express thoughts and feelings during the arousal of anxiety or fear (Scherer, 1995).

Subsequent analyses showed that shifts in acoustical measures from relational reframe to empty-chair enactment could not be accounted for by the passage of time. Our impression is that instead, during the empty-chair enactments, participants faced their fear/anxiety that the significant other might respond in an indifferent, rejecting, or even punitive manner. Facing and overcoming one's fears of accessing and experiencing painful threatening primary emotions, as well as one's fears of being vulnerable while expressing hurt and longing to the significant other, is a purported core change mechanism in relationally oriented experiential therapies. In the same way that Foa and colleagues (2006) found that prolonged exposure to fear/anxiety-producing stimuli (i.e., people, situations, and thoughts) reduced avoidance and led to the development of more reality-based, adaptive cognitive–emotional–behavioral schema among anxiety-disordered patients, staying with and directly expressing difficult, threatening, vulnerable attachment-related feelings in experiential therapy is thought to make such feelings more tolerable as well as to promote adaptive approach behaviors (i.e., interpersonal engagement) that contribute to the resolution of interpersonal conflict in general and unresolved anger in particular.

In contrast to our hypotheses, the shift from relational reframe to empty-chair interventions was not characterized by increased sadness/vulnerability. We had assumed that articulating one's sense of loss, hurt, longing, and sadness in the first person, directly to the imagined significant other as if he/she were in the room, would facilitate the deepening and arousal of such emotions. Results showed, however, that voice-quality-related measures thought to reflect sadness and vulnerability did not increase during empty-chair enactments. In fact, two of these voice-quality measures (e.g., PPQ and NHR) and the voice-continuity measure (Vdeg) actually decreased from relational reframe to empty-chair enactment, though they remained higher than baseline levels. It seems that during empty-chair enactments, participants' fear/anxiety about potential rejection, criticism, or attack by the significant other competed with and to some degree moderated the concomitant experience of vulnerability and sadness.

A number of methodological strengths of this study are worth mentioning. Participants were carefully selected, and only those cases clearly evidencing unresolved anger toward an attachment figure were included in the study. The interventions examined were clearly defined and administered in a standardized manner. The segments chosen for analyses were selected because they unambiguously reflected expressions of sadness and loss, on the basis of ratings by trained, objective coders who were naïve to the purpose and hypotheses of the study. Finally, objective measures of physiological arousal (i.e., voice acoustical properties) were utilized to indicate levels of sadness and anxiety. This high level of experimental control increases our confidence regarding the internal validity of our findings. It is also worth noting that the interventions examined were derived from two empirically supported, experiential, relational therapies and delivered by advanced Ph.D. psychology interns trained in such techniques, contributing to the external validity of the findings.

Despite these methodological strengths, it is important to remember that our results were based on single sessions of analogue therapy with individuals reporting significant unresolved anger rather than ongoing treatment administered to a population with a defined clinical disorder. Consequently, it is difficult to know whether the interventions studied would have had similar effects on treatment-seeking clients from the community, though our clinical experience with actual clients suggests that this would, indeed, be the case. Moreover, the design of the study was such that empty-chair interventions were always delivered subsequent to relational reframes interventions. This was necessary because we could not ask participants to directly express their hurt and longing to the imagined other before such hurt and longing had been elicited via the relational reframe. Nevertheless, the fact that interventions were not counterbalanced raises questions about how empty-chair enactments might impact upon clients when delivered in isolation from relational reframes. The analogue setting also makes it difficult to tease apart anxiety due to experiencing vulnerable emotions in the presence of a relative stranger from anxiety due to imagining disclosing one's feelings directly to the object of one's anger and hurt. However, it should be noted that during the relational reframe interventions, which also involved experiencing vulnerable emotions, there was no evidence of anxiety. It is also possible that the procedure for selecting the text to be analyzed somewhat biased the findings. More specifically, because we analyzed the speech subsequent to the last attempt at

implementing the interventions, there is more likelihood that these attempts were successful. It is also important to note that all of the participants were women, and therefore the degree to which these results would generalize to men is unclear.

Despite these limitations, these findings are among the first to identify specific psychotherapy interventions linked with arousing primary, vulnerable emotions in the context of psychotherapy. These findings lend support to our clinical experience, which suggests that relational reframes and empty-chair interventions serve to elicit primary, vulnerable emotions in the context of unresolved anger. These findings also emphasize the power and utility of conducting imaginal enactments. Such enactments serve not only to elicit sadness, pain, and longing but also to arouse attachment-related fear/anxiety schema and, presumably, make them available for transformation. In the context of unresolved anger, overcoming the fear of experiencing and expressing one's sadness and vulnerability is thought to reduce the need for and use of maladaptive, secondary, defensive anger and increase open, direct expression of attachment needs. By employing the sequence of relational reframe interventions followed by empty-chair interventions, therapists can help clients not only access their pain but also work through associated unmet or frustrated attachment needs in their relationship with the significant other.

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