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THE ARCHIVAL ANATOMY OF A DISASTER: MEDIA COVERAGE AND COMMUNITY-WIDE HEALTH EFFECTS OF THE TEXAS A&M BONFIRE TRAGEDY

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A community-wide trauma leaves its mark on all aspects of the community. Following the death of 12 Texas A&M students who died as part of an annual bonfire ritual, linguistic analyses of student newspapers and changes in student health center visits were analyzed at both Texas A&M and the University of Texas at Austin. Newspaper reports in the first days after the accident were rich in emotional content and reflect an increase in both self- and collective focus. The coverage of the disaster decreased sharply in the weeks after the accident, became shorter on average, and grew distanced and intellectualized. Compared to news coverage from the University of Texas, the Texas A&M newspaper evidenced lower levels of negative emotions and death-related themes. Consistent with a social stages of coping model, the linguistic shifts covaried with increased rates of illness. However, within two months of the accident, the health of A&M students increased dramatically compared to levels prior to the accident. Implications for the social stages of coping in newsprint and for the collective health in a unique community are discussed.

In the early morning hours of Thursday, November 18, 1999, approximately 5,000 logs unexpectedly collapsed as they were being assembled for the annual Texas A&M bonfire. Twelve students involved in the con-

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struction project were killed and 27 others were injured (Morse, 1999). The bonfire had been a central feature of the A&M community for 90 years and had served as an annual ritual by which to bring the university together in preparation for the "big" football game against archrival University of Texas at Austin (UT). News of the disaster spread immediately throughout the A&M community. Both in the media and in spoken word, the belief that the students "had given their lives for the bonfire" was often repeated (Wilson, 1999). The repercussions of the bonfire accident unfolded over several months. Six months after the tragedy, a special commission published a comprehensive report on the causes of the accident, including poor construction techniques and inadequate supervision of the students, and recommended that the bonfire tradition be suspended (Associated Press, 2000).

In many ways, the bonfire collapse was a unique event. It involved the death of a large group of healthy students at a university famous for its school spirit and tight social bonds. That the tragedy occurred as part of a highly symbolic ritual within the university added to the psychological significance of the event. The purpose of this project was to explore some of the social and psychological markers of the bonfire as evidenced in archival records. Although the theoretical basis of the project is based loosely on a social stage model of collective coping (Pennebaker & Harber, 1993), it is ultimately an empirical study that maps a unique event.

THE NATURE OF COLLECTIVE TRAUMA

When trauma strikes a community, the event produces a collective experience of shock and grief. One of the first reactions to most collectively shared traumas, such as natural disasters, epidemics, or the unexpected death of prominent members of the group, is that people immediately band together and talk about the experience (Rimé, Mesquita, Philippot, & Boca, 1991). This "social sharing" allows for individuals to construct a collective script of the disaster, highlighting aspects that will facilitate the processing of the trauma. During such upheavals, social norms that prohibit talking with strangers in public places are altered and a natural, interpersonal coping process emerges.

Several researchers have shown that it is possible to look at the effects of collectively shared upheavals over time. Pennebaker and Harber (1993) monitored the degree of social sharing that occurred in the weeks after the Loma Prieta Earthquake in the San Francisco Bay area in 1989. Surveys based on random digit dialing (RDD) samples found that affected residents talked about the earthquake at very high rates during the first two weeks after the disaster. After that time, the talking rates

dropped drastically to almost nonexistent. A parallel study was conducted in early 1991 among residents of Dallas, Texas in response to the outbreak of the Persian Gulf War. As with the earthquake project, RDD respondents who were sampled weekly over the three months following the war's onset, reported very high rates of social sharing about the war for two to three weeks, and then a sharp drop in talking thereafter. Note that these drops in talking were not gradual nor linear—people first talked multiple times per day and then within the space of a few days, they simply stopped discussing the upheavals. Interestingly, in both projects, rates of people's reports of thinking about the emotional upheavals gradually dropped over a six- to eight-week period. In other words, from approximately two to three weeks after the earthquake and the war until six to eight weeks afterward, people reported thinking about the events at high rates but not talking about them with others.

These observations gave rise to a social stage model of coping with disaster (Pennebaker & Harber, 1993). The first stage of the model, the emergency phase, lasts on average about two to three weeks after the disaster and is characterized by individuals' reporting obsessive thoughts and recurring emotional upheavals. At this time, people openly share their thoughts and feelings with others, even strangers. The second stage, called the inhibition phase, is marked by significant decreases in talking about the event, but also by continued thoughts and dreams about it. About six to 12 weeks after the event, in the adaptation phase, both thoughts and talking about the disaster have diminished to a low level.

Unlike a traditional personal stage model wherein the focus is on how individuals evolve in the ways they cope after an upheaval (cf. Kübler-Ross, 1966; Horowitz, 1976), a social stage model assumes that one's social network undergoes predictable changes as a collective upheaval unfolds. Not only do the ways people talk change over time, but the social changes have implications for a variety of markers of health and well-being. For example, markers of social stress and disruption did not occur during the emergency phases of the earthquake and war. Rather, rates of self-reported fights with family and coworkers in both studies, as well as community rates of aggravated assaults increased beginning with the inhibition phase—lasting from two to three weeks after until six to eight weeks after the events. Similarly, self-reports of physical symptoms were elevated during the inhibition period but not during the emergency or adaptation phases (Pennebaker & Harber, 1993).

Other studies have simply tracked the social changes after an upheaval. An analysis of Internet, real-time chatroom dialogue after the death of Princess Diana and her companion Dodi Fayed in 1997 was able to uncover conversational patterns over time that supported the social

stages model of coping with disaster (Stone & Pennebaker, 2002). Members of America Online (AOL) chatrooms showed high levels of collectively shared grief in the first week, after which there occurred a sharp decrease in talking about Diana's death. This decrease coincided with constraining statements from chatroom members who had "heard enough already" about the tragedy.

While talking about a collective traumatic experience is a natural occurrence and involves a direct addressee (Rimé et al., 1991; Rimé, 1995), written newspaper portrayals of a collective traumatic event, especially within that community, represent an indirect form of creating a social script of the collective experience. The newspaper can be a mirror of how such traumatic experiences are "worked through" and resolved on a collective and cultural level.

Prior linguistic analyses of disasters in newspapers have shown that newspapers do indeed reflect the psychological dynamics in society, making newspapers a valuable archival source for the collective script of a trauma. By examining disaster reporting and emotional discourse in *The New York Times* over the course of 100 years, Barton (1998) found that a disaster's representation in newsprint accurately represents "the characteristics of American public and private expressive life" and the emotional turmoil of each respective era. An analysis of *The New York Times'* reporting of the Challenger Space Shuttle Disaster in 1986 showed that newspapers also seek to find spontaneous explanations for complex events, signifying a parallel process to conversations that take place between members of the community (Hilton, Mathes, & Trabasso, 1992). Durham (1998) observed that this is the case even if an appropriate explanation is not immediately apparent, as was the case with the TWA Flight 800 crash in July 1996. News framing, or proposing a sole explanation of a disaster, happens as a "fundamental social process of meaning-making"—in a way that a certain news frame represents a social narrative. In fact, Reese (1990) defines the purpose of journalistic objectivity as an attempt to make sense of the world in a way that leaves sense-makers in control of meaning-making for the community. Indeed, meaning- and sense-making of a traumatic event in newspapers evolve in stages over time—these stages in turn mirror social stages of meaning-making in the community (Hilton et al., 1992). Therefore, newspaper reports can help individuals within the afflicted community to make sense and meaning of the tragedy and at the same time represent their community's emotions and its need to assess the consequences of the disaster.

The literature reviewed above suggests that the way a community talks about and makes sense of a traumatic event is reflected in the media parallel to the social stages of coping. However, how unique and sym-

bolic events like the A&M tragedy are portrayed as an open, community-wide phenomenon in newspapers still lacks thorough analysis. This study addresses this question.

It is also expected that a large socially shared trauma can affect the stress levels and physical health of an entire community. While we sought to map and analyze a unique collective trauma as it is described in newspapers, we also examined the health of the affected community throughout the stages of coping.

It is well-established that social stressors have an adverse effect on individual health (e.g., Cohen, Gottlieb, & Underwood, 2001; Sapolsky, 1998). Just as individual stress can be measured on a case by case level, the health of a larger social group—such as an entire community—can be considered as a marker of the group's collective stress. Indeed, deaths due to heart disease increased in Dallas, Texas in the years following the assassination of President John F. Kennedy relative to other towns in the U.S. (Pennebaker, Paez, & Rimé, 1997). By the same token, self-reports of health problems increased in the three to eight weeks following the Loma Prieta Earthquake in San Francisco and among community participants following the Persian Gulf War (Pennebaker & Harber, 1993). Similarly, health center visits at a university have been shown to fluctuate as a function of traumatic events, collective emotional distress, and stress on campus (Halverson-Strong, 1995; Shelton & Sanders, 1973).

In the present study, we sought to study how students at both A&M and UT changed in their health center visits for illness in the months surrounding the bonfire accident. It was assumed that the bonfire would be viewed as a far greater stressor at A&M compared with UT and that there would be an elevation in physician visits in the months after its occurrence—in line with our social stages predictions.

In sum, the study had three goals. First, we sought to track the writing about a unique collective event as it occurred in the newspaper of the afflicted community. In this case, we sought to analyze the social and psychological markers of the bonfire accident in the Texas A&M student newspaper, *The Battalion*. By subjecting bonfire-related newspaper articles to linguistic analysis, we hoped to uncover how the consequences of such a disaster unfolded emotionally as well as in their search for a cause and meaning. As a comparison, we subjected the student newspaper of the University of Texas at Austin, *The Daily Texan*, to linguistic analysis as well. Although the characteristics of the student population at UT Austin are similar to Texas A&M's, we assumed that the two newspapers would view the bonfire disaster in a different light due to their differential involvement in the tragedy.

Second, we sought to uncover evidence for the social stages of coping in newsprint by studying the linguistic features of newspaper writing.

According to Pennebaker and Harber (1993), an emergency phase was to be expected for about two weeks after the accident, during which a large amount of bonfire-related articles would be found in the student newspapers. Emotional words, collective and self-focus words, as well as death-related words would be anticipated to occur at higher rates than during the week before the accident. Bonfire-related articles would furthermore be detailed and elaborate in order to adequately inform the public. It follows as a logical prediction that in the following inhibition phase, the relative percentage of bonfire-related articles is expected to drop, as is expected with any newsworthy event after time passes. However, in addition to a decrease in overall reporting on the bonfire, we also expect that emotions and death-related writings would decline in usage. Moreover, we anticipated that at this time, bonfire-related articles would become shorter and less elaborate. At the same time that these categories would drop, we would expect linguistic categories of causation and meaning-finding to rise after the accident as explanations for the tragedy would be sought by the afflicted community.

Third, we wanted to pursue the effects of the social stages of coping on the community's physical health. For this purpose, university health center data were compiled from both Texas A&M, where the stages were expected to occur, and the University of Texas, the control school that was not directly impacted by the trauma. We anticipated that health center visits would increase substantially at Texas A&M, but not at the University of Texas, during the inhibition phase. At Texas A&M, health center visits were expected to recover back to the baseline during the adaptation phase.

METHOD

LINGUISTIC DATA SOURCE

All bonfire- and nonbonfire-related articles from the student newspapers *The Battalion* (Texas A&M University) and *The Daily Texan* (University of Texas at Austin) were downloaded from the respective webpages on the Internet. An article was determined to be bonfire-related if it contained the word "bonfire." The articles were saved according to their sections of origination, which were divided into "front page," "world and nation," "sports," "university," "opinion/letters to the editor," and "entertainment." Attempts to find a control college newspaper outside Texas proved fruitless in that no major college paper devoted more than two to four articles to the bonfire and, in all cases, were syndicated (e.g., Associated Press) articles.

In order to obtain an effective baseline of word usage, all newspaper

contents from a month before the accident, October 1999, were downloaded as well. The downloads thus ranged from October 1, 1999 until February 25, 2000, which was 14 weeks after the accident. For the baseline, both bonfire- and nonbonfire-related articles were assessed, since in the month before the accident very few bonfire-related articles were published. For the analysis in the week of and the weeks after the accident, we focused on bonfire-related articles only. Overall, 161 articles from Texas A&M's *The Battalion* and 239 articles from the University of Texas *The Daily Texan* were included. Of these articles, 57 from *The Battalion* and 51 from *The Daily Texan* were bonfire-related. Note that the higher number of articles from *The Daily Texan* is the result of its being a larger newspaper that publishes a greater amount of articles than *The Battalion*. Both newspapers publish with equal frequency—five days a week, excluding holidays and semester breaks.

ANALYSIS STRATEGY

To obtain a picture of the linguistic dimensions of the newspaper reports, all articles were subjected to the computer-based text analysis program LIWC (Linguistic Inquiry and Word Count; for a complete description, see Pennebaker & Francis, 1996; Pennebaker, Francis, & Booth, 2001). This program analyzes texts on a probabilistic basis by comparing files on a word by word basis to a dictionary of over 2,000 words and word stems. These are organized into over 70 language categories, including linguistic dimensions (words per sentence, articles, etc.), psychological processes (e.g., emotional and cognitive), relativity (e.g., in time and space), and personal concerns (sports, religion, death, etc.). The text analysis produces the analyzed text as the percentage of total words found along these language categories. Although LIWC provides data from more than 70 categories, we narrowed our focus to the analysis of seven overall categories based on former trauma research (Pennebaker, Mayne, & Francis, 1997; Pennebaker & King, 1999; Stone & Pennebaker, 2002). First, we examined overall word count to examine the extent and detail to which each of the school newspapers was reporting on the tragedy. Second, we considered differences in the use of the words "I" and "we" between Texas A&M and UT Austin. These words were selected to gain insight to the degree to which writers used inclusive language and to examine shifts in perspective between the individual and collective self. Third, we inspected differences in the use of positive and negative emotion words between the two schools. Fourth, we examined causal and insight words to explore differences in cognitive processes reflected by the use of these words. Fifth, we studied differences in words longer than six letters, which indicates elaboration

and sophistication in writing. Finally, we focused on words related to social processes to examine cohesion on both campuses after the accident, and death-related words to tap into the amount of processing of death-related topics by each newspaper (Table 1).

HEALTH CENTER DATA

To compare the two universities' collective health status, health center visits were obtained from both universities for the period of September 1999 to April 2000. For the purpose of this study, total health center visits and visits to the corresponding medical clinic were compared for both universities. While total health center visits include areas such as urgent care, sports medicine, women's clinic, physical therapy, preventive care, lab work, radiology, and pharmacy, the medical clinic addresses everyday health concerns of students, such as acute internal infections or other medical concerns that are mostly unrelated to injury. The data from both health centers was corrected for the number of students enrolled at each university and for the number of days each health center and its corresponding medical clinic was open. Both universities are approximately equal with regard to the age, gender, and socio-economic status make-up of their student populations—these variables were thus not used as covariates in the analysis. Furthermore, the researchers took care to assess any other community or historic events during the study period that may render an alternative explanation for the findings; however, no such events are known.

RESULTS

FREQUENCY OF BONFIRE-RELATED ARTICLES

In order to obtain a general idea of the frequency the newspaper wrote about the bonfire over time, the number of bonfire-related articles per week were counted in A&M's *The Battalion* and UT's *The Daily Texan*. While the day after the accident (November 19, 1999), 100% of the articles in *The Battalion* were bonfire-related, the next issue of the paper, which was published after the weekend, three days later, had reduced its bonfire-related articles to 37.5%. On November 23, the rate of articles about the disaster had fallen to 23.8%. The extent that A&M's *The Battalion* reported about the bonfire decreased more or less constantly over the next ten days, reaching a low of 6.7% on December 3, 1999 (see Figure 1). A Pearson correlation between the number of days after the accident and the percentage of bonfire-related articles in *The Battalion* was highly significant, $r(13) = -.81, p < .01$. Although UT's *The Daily Texan* was naturally

TABLE 1. Word Count and Mean Percentages of LIWC Dimensions from Control School and Texas A&M Newspapers Articles

Dimension	Example	Period -1 (Control)	Period 0	Period 1	Period 2	Effects
I. Standard Linguistic Dimensions						
Word Count (total)						
Texas A&M		458.58	706.9	475.27	459.42	W, I#
Univ. of Texas		530.91	631.19	691.75	409.71	
Words > 6 letters						
Texas A&M		25.15	23.63	25.71	27.02	W
Univ. of Texas		24.84	23.36	23.35	27.59	
Pronoun: first person plural	We, us, our					
Texas A&M		0.59	0.96	1.57	0.79	W, I
Univ. of Texas		0.59	1.48	0.48	0.78	
Total first person (Self)	I, we, me					
Texas A&M		1.17	2.46	2.2	1.77	W
Univ. of Texas		1.16	2.16	1.18	1.74	
II. Psychological Processes						
Negative Emotions	Hate, worthless, sad					
Texas A&M		1.21	2.21	1.69	1.15	W
Univ. of Texas		1.15	1.8	1.53	1.53	

Causation	Because, why, hence				S,W
Texas A&M		0.64	0.78	0.99	0.91
Univ. of Texas		0.52	0.6	0.55	0.78
Insight	Think, know, consider				W,#
Texas A&M		1.18	1.75	1.75	1.32
Univ. of Texas		1.03	1.41	1.33	1.88
Social Processes	Talk, us, friend				S,W
Texas A&M		8.27	10.29	9.3	9.22
Univ. of Texas		7.3	9.29	9.06	7.51
III. Personal Concerns					
Death and dying	Dead, burial, coffin				S, W
Texas A&M		0.17	0.54	0.35	0.16
Univ. of Texas		0.18	0.55	0.65	0.39

Note: Period -1 (Control) refers to the month before the accident, for which both bonfire- and non-bonfire-related articles were taken into account. Period 0, 1, and 2 refer to the analysis of bonfire related articles in one week, two to four weeks, and nine-to-13 weeks following the accident, respectively. These intervals were chosen for two reasons: to simulate the social stages of coping and to accommodate the times in which the student newspapers were not published, Thanksgiving and Christmas Breaks. Effects refer to significant ($p < .05$) 2 (school) \times 4 (period) ANOVAs with Bonferroni adjusted post hoc comparisons across schools and periods, where: S = School Effect, W = Week Effect, and I = Interaction effect. # refers to an effect where $p < 0.1$ (two-tailed).

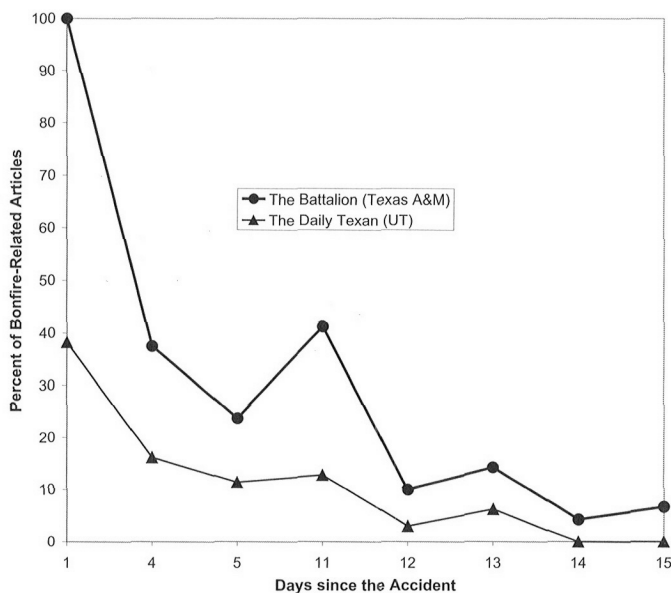


FIGURE 1. Relationship between the number of bonfire-related articles and the number of days after the accident.

less concerned with the bonfire accident, a similar pattern was observed in this paper (Figure 1). Thirty-eight percent of the paper's articles reported on the bonfire the day after the accident. Three days later, only 16% of the articles were bonfire-related, and two weeks after the accident, *The Daily Texan* had stopped reporting on the tragedy. A Pearson correlation between the number of days after the accident and the percentage of bonfire-related articles in *The Daily Texan* was also highly significant, $r(13) = -.88$, $p < .01$. As was the case with shared grief in chatrooms after the death of Princess Diana (Stone & Pennebaker, 2002), reporting about the bonfire dropped sharply even within the first week of the event, representing the emergency and inhibition phases. Interestingly, the initial drop in reporting was more marked at Texas A&M than at the control school.

LINGUISTIC CATEGORIES

Of central interest in this study were the types of linguistic categories that news reporters used in their writings in the days and weeks after the

bonfire collapse. In order to assess the relative percentage of linguistic dimensions over time, we divided our analysis into four periods: Period 1, which depicts the time before the accident (baseline, October 1999); Period 0, which depicts the seven days after the accident; Period 1, which depicts roughly the next two weeks, namely the time from after Thanksgiving until Christmas Break; and finally Period 2, which depicts the six weeks after Christmas Break until the end of February. This division of time was chosen to adequately represent the social stages of coping (Pennebaker & Harber, 1993). No student newspapers were published over Thanksgiving and Christmas Breaks.

It can be assumed that the linguistic data being observed over the time periods is independent and was produced by a rather large amount of writers. According to the news editors, up to 12 writers were on the bonfire case for *The Daily Texan* (M. Drofjack, editor, personal communication, April 9, 2002) and up to 25 writers were on the bonfire case for A&M's *The Battalion* (M. Castillo, editor, personal communication, April 10, 2002) at different points in time. Furthermore, reporters assigned to the bonfire changed over our periods of interest. This is not including the numerous letters to the editor written by separate writers on their experience with the bonfire, which again are several independent data points for each time period.

The LIWC categories of interest were thus submitted to 2 (university) \times 4 (time period) analyses of variance (ANOVAs) with Bonferroni adjustment for multiple comparisons across schools and weeks. The effects are summarized in Table 1.

School Main Effects. The language in both newspapers changed dramatically over the weeks following the accident. Overall, Texas A&M's *The Battalion* was significantly more collective and social in its orientation (i.e., use of social words), $F(1, 2) = 4.18, p < 0.05$; was more involved in the search for causes and meaning (i.e., use of causal words), $F(1, 2) = 7.34, p < 0.01$, and used fewer death-related words than the University of Texas newspaper, $F(1, 2) = 3.73, p = 0.05$. Even though there was a strong school effect for both social and death-related words, both of these categories increased linearly over the study period for both schools [$F(1,3) = 6.78, p < 0.001$ and $F(1,3) = 13.29, p < 0.001$, respectively]. Furthermore, writers for A&M's *The Battalion* were more self-focused (first person singular) during the week of the accident, $F(1, 2) = 3.45, p < 0.01$. Note that this higher rate of first person singular is also consistent with findings that suggest that individuals who are depressed (Rude, Gortner, & Pennebaker, in press) and suicide-prone (Stirman & Pennebaker, 2001) use words such as "I," "me," and "my" at elevated rates.

Article Length and Intellectualization. Texas A&M's bonfire-related articles were the longest in the week following the accident, with a sharp

drop in word count back to baseline one week later, $F(1,3) = 6.80, p < 0.001$. UT, however, consistently increased the length of its bonfire-related articles until Christmas, a trend that interacted with A&M's pattern in a marginally significant fashion, $F(1,3) = 2.034, p = 0.10$. Contrary to expectations, Texas A&M did not display significantly longer or more elaborate articles than UT. In fact, UT had a tendency to be more elaborate than Texas A&M in the weeks after the accident. Furthermore, after being initially bold and straightforward the week of the accident, both universities showed signs of intellectualizing and distancing themselves after the accident (as measured in the percentage of large words that are longer than six letters), $F(1, 3) = 3.12, p < 0.05$.

Self- and Collective Focus. Both newspapers demonstrated a peak in self-focus in their articles during the week following the disaster [$F(1,3) = 10.4, p < 0.001$], and Texas A&M remained self-focused until after Christmas.

Both universities increased their collective focus in their articles—as measured by the use of first person plural pronouns (e.g., we, us, our)—but at curiously different points in time. Articles at UT exhibited collectiveness and unity (presenting the two schools as essentially “one family” that sticks together despite rivalry in the face of tragedy) in the week following the accident, dropping in collective focus the week after [$F(1,3) = 10.14, p < 0.01$]—a pattern consistent with individuals talking about the death of Princess Diana (Stone & Pennebaker, 2002). The articles at Texas A&M, on the other hand, didn't peak in collectiveness until a week later, the week between Thanksgiving and Christmas Break. This collective focus decreased sharply after Christmas, [interaction effect, $F(1,3) = 4.91, p < 0.01$]. During the week following the accident, writings at Texas A&M showed that the school was significantly more concerned with itself and its tight-knit collective community (as measured in “we-”related words, $F(1,3) = 9.02, p < 0.001$). As predicted, Texas A&M emphasized the collective self of the university.

Emotion Words. Emotionally, writings at both schools understandably peaked in negative emotion words the week following the accident [$F(1,3) = 10.1, p < 0.001$]. While Texas A&M immediately and consistently decreased its negative emotions, UT dropped only slightly and leveled off at Christmas. Again, Texas A&M showed signs of an inhibition stage before UT did—negative emotions became almost nonexistent immediately after they appeared. Contrary to expectations, however, positive emotions showed no significant effects.

Meaning, Cause, and Insight. The search for meaning in the tragedy (as measured by the percentage of words that represent cognitive mechanisms) increased linearly across weeks for both schools, $F(1,3) = 5.74, p < 0.001$. Words of causality were clearly used more by Texas A&M, $F(1,2)$

= 7.34, $p < 0.01$; and their use as well increased linearly in both schools, $F(1,3) = 3.45$, $p < 0.05$. Overall, news reports at A&M seemed to be more concerned with the search for causes and reasons than at UT. Understanding about the accident, however, took on a different pattern (as measured by the percentage of insight-related words). Insight leveled off right after the accident and then dropped back to baseline again after Christmas at Texas A&M, $F(1,3) = 8.14$, $p < 0.001$. Articles at UT, on the other hand, linearly increased in insight, even beyond Christmas (non-significant interaction, $F(1,3) = 2.35$, $p < 0.08$).

HEALTH EFFECTS

A general log linear model was used to compare the distributions of health center visits of Texas A&M University and the University of Texas at Austin. Variables of interest were differences by school, time, and time \times school interaction. The distributions for total health center (concerned with all areas of medicine) and medical clinic visits (concerned with acute illness) may be viewed in Figures 2 and 3, respectively. The results highlight that both schools differed greatly in total visits to the health center [$G^2(7) = 2204.07$, $p < 0.001$] and in their visits to the medical clinic ($G^2(23) = 2361.29$, $p < 0.001$) over time. While remaining at a normal level during the emergency phase in November, the total number of visits to the Texas A&M health center increased dramatically in December 1999. At the control school (UT), the total number of visits to the health center decreased at that time (interaction effect, $G^2(23) = 19100.35$, $p < 0.0001$). The same pattern can be observed in visits to the medical clinic—the number of students seeking medical treatment increased dramatically at Texas A&M in December 1999, while it decreased at the University of Texas [interaction effect, $G^2(23) = 18473.59$, $p < 0.0001$]. These peaks in visits to the health center and the medical clinic coincide with the inhibition phase of the social stages of coping and all its associated linguistic changes. Once the community moved to the adaptation phase in January 2000, visits to the health center began to decrease again at Texas A&M and continued to do so drastically until April. This extreme drop represents a somewhat surprising and radical improvement of collective health in the Texas A&M community in the months after the disaster.

DISCUSSION

The primary purpose of this project was to examine content and texture of newspaper reports about a traumatic event and their relationship to

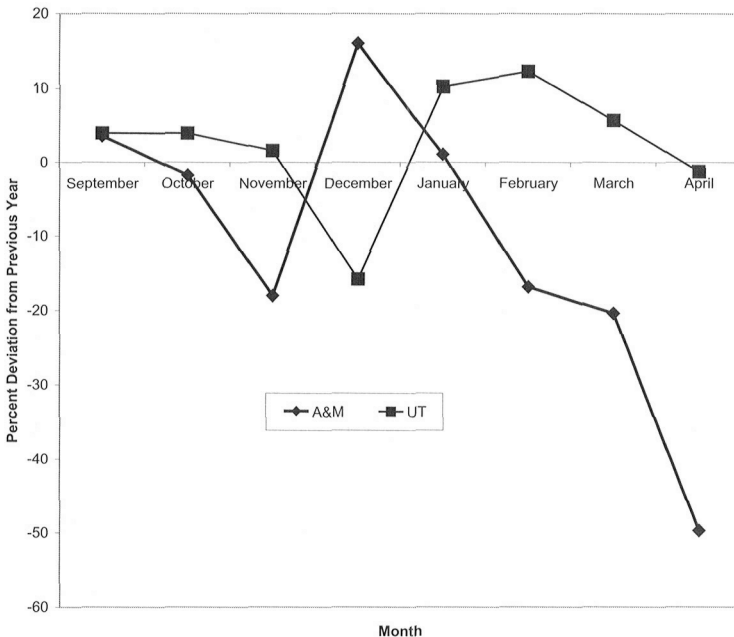


FIGURE 2. Total number of visits to the Texas A&M and the University of Texas at Austin health centers from September 1999 to April 2000. The graph depicts the percent deviation from the previous year.

the communities' collective health. The LIWC data revealed fascinating patterns in the ways student newspapers wrote about the disastrous collapse of the bonfire. Foremost, the degree to which the collapse was covered in the Texas A&M newspaper dropped immediately following the accident in a negatively decelerating fashion. Thus, by the third week after the accident, only a small number of articles made reference to the bonfire collapse. These patterns are congruent with the social stage model of talking about trauma and coincide with the findings of Stone and Pennebaker (2002) that analyzed the way people wrote about Princess Diana's death in online chatrooms. Moreover, the rapid decrease in bonfire-related articles to a mere 6.7% 15 days after the accident coincides with a dramatic increase in visits to the health center. Total visits as well as visits to the medical clinic rose sharply during the inhibition phase. This study provides evidence that the social stages of coping are not only represented in newsprint but also in the community's health.

Linguistic analysis of the bonfire-related articles brought about several interesting findings. First, the nature of self-other relations, as measured by pronoun usage, briefly changed in newspaper writings during

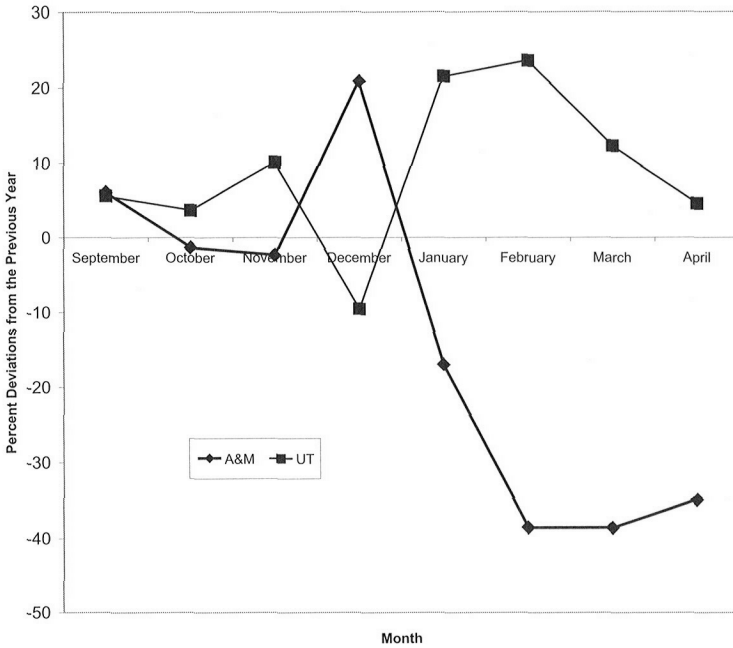


FIGURE 3. Number of visits to the Texas A&M and the University of Texas at Austin medical clinics from September 1999 to April 2000. The graph depicts the percent deviation from the previous year.

the week after the accident. After the accident, writers of the articles at Texas A&M made more self-references and at the same time became more collectively and socially oriented in their verbal expressions. Importantly, however, writings at Texas A&M were more collectively and socially oriented throughout the entire study period, underlining the uniqueness of this close-knit community. This collective orientation represents a unique form of social sharing. Not only was it displayed in acts of loyalty and school spirit after the tragedy, but also as a form of “collective closure” in news reports about the trauma.

The collective and self-focus remained high at Texas A&M until after Christmas, while UT had reduced its collective and self-focus back to baseline after Thanksgiving Break. Simultaneously, authors in student newspapers brought their own person (I, me, my) into perspective with this collective event. These findings differ from those in the Princess Diana study where chatroom participants spoke less about themselves as individuals but were more likely to become collective in their language (Stone and Pennebaker, 2002). One big difference between these two studies is that the A&M campus community was directly affected by the

bonfire accident. Campus life at the university was altered for weeks due to the accident—memorials were held, donations made, the victims were buried. Students were part of these ceremonies. Not only would these events increase the collective focus, but because of such direct trauma, an individual writing about the event would bring him- or herself into the story, especially since it has been shown that self-focus increases in depressed individuals (Rude et al., in press; Stirman & Pennebaker, 2001). Furthermore, the use of self-references has been linked to embracing the topic rather than avoiding it (Wiener & Mehrabian, 1968).

It is natural that writings in a community, which has been affected by the collapse of a highly symbolic structure, would try to take hold of the topic and own it through self-referencing words such as "I," "mine," and "our." While the writers in newspapers used the first person singular to reflect their own point of view and their own involvement in the trauma, a plural self-reference ("we") suggests reader-directedness (Jacobs, 1999) and solidarity (Rogers & Swales, 1990), reflecting a switch out of one's own perspective to a collective perspective. This resonates in the following statement in Texas A&M's *The Battalion*: "We students owe it to the students who were killed to let their parents know they are blameless. [...]The experience of comforting another in a time of loss makes loss more bearable and prepares us for future losses that are greater and closer" (November 22, 1999, p. 7). The increase in self- and other focus is a sign of self- and other comforting. Texas A&M is thus a unique community in that it can continuously maintain its collective orientation and a united spirit in the face of the tragedy, while allowing each individual to tell his or her own narrative. The individual's experience is not discounted while being an integral part of the collective whole. The control school's peak in self- and other focus in newspaper writings, however, was only short-lived, underlining the uniqueness of the Texas A&M experience.

Emotional expression took on a curious pattern at Texas A&M. About two weeks after the accident, news reports at Texas A&M dropped in their expression of negative emotion as compared to the control school. Such a finding confirms our expectations about increased emotional expression during the emergency phase and the inhibition thereof in the inhibition phase. The occurrence of positive emotions in newspaper articles had been left unaffected by the bonfire accident. It seems that while negative emotions about the tragedy were simply not expressed, no other emotions were allowed to surface. How can this quick reduction in use of negative emotions be explained? While the disaster "brought the city together" during in the Loma Prieta Earthquake, the apparent inhibition of emotional expression took place two weeks after the earth-

quake (Pennebaker & Harber, 1993). By that time, the traditional norms that prohibit public emotional sharing had reclaimed their place in society, causing people to inhibit their social sharing of the experience. In chatrooms discussing Princess Diana's death, participants talked less about Princess Diana about two weeks after her death, mainly because they were socially sanctioned for it by other chatroom participants (Stone & Pennebaker, 2002). In the case of newsprint, emotional inhibition in writing can take place for the same reason: The audience is tired of reading about the trauma, and news reporters on campus may be sanctioned, directly or indirectly, against repeatedly expressing the collective grief for the community. On the other hand, this inhibition may well have been an attempt to keep a certain journalistic objectivity while the emotional life on campus reflected a chaotic breakdown.

Writing about death-related topics revealed the same pattern—a sharp decline occurred at Texas A&M two weeks after the accident, while the University of Texas continued discussing death in their newspaper writings at an increased rate until after Christmas (eight weeks later). The control school indicated no signs of inhibiting death-related discussion or negative emotions about the accident. This finding replicates the suppression of death-related topics after two weeks in online chatrooms after Princess Diana's death (Stone & Pennebaker, 2002). UT demonstrated a school effect for death-related topics—*The Daily Texan* seemed to draw more attention to the fact that the bonfire collapse actually took the lives of 12 students. In the culture and spirit of Texas A&M, death-related topics were instead replaced with the concern about “keeping the fire burning.” A father of a bonfire victim openly criticized the decision to suspend the bonfire ceremony: “I am speaking for my son, because he's not here to speak for himself. As a father, it is hard, but I know in my heart that Jerry would want the bonfire to burn this fall” (Associated Press, 2000, p. 1).

According to these findings, the social stages of coping with disaster appear to occur in written news reports in addition to previous research on spoken word. Consistent with the inhibition phase, the A&M newspaper exhibited fewer articles and articles using bigger words, fewer emotions, and fewer death references in the two months after the tragedy. As predicted, illness visits increased at this same time. One explanation for such findings of linguistic inhibition and ill health effects is the previously discussed impact of social stressors on an individual's health (Cohen et al., 2001; Sapolsky, 1998). While an individual's stress can be linked to health markers on a case by case level, the health of a larger social group, such as the A&M community, can be considered a marker of the group's collective stress. Previous research has laid out specific stages and time frames for stressors to take their physiological

toll. For example, Selye's General Adaptation Syndrome (1976) introduces such a physiological time frame—after respective alarm and resistance stages, physical exhaustion causes illness in individuals coping with stress and trauma. Similarly, Kiecolt-Glaser and Glaser (e.g., 1989, 1991) have shown in numerous studies that an increase in psychological distress, sustained over time, leads to adverse immunological changes, causing increased incidence of infectious and malignant disease. These models provide a framework for the stress-health link, which can explain the health outcomes in this study.

Another justification for these health effects is Pennebaker's (1989) model of inhibition. This model postulates that constraining one's thoughts and feelings about an emotional upheaval, both on an individual and collective plane, is physiologically stressful. While discussing and disclosing one's emotional upheaval can lead to both immediate and long-term benefits, (Pennebaker, 1993; Pennebaker & Francis, 1996), the inhibition of such has been shown to lead to ill health effects (Cole, Kemeny, Taylor, & Visscher, 1996).

An alternative explanation for these findings of inhibition and emotional suppression can be found when looking to the stages of bereavement. Individuals who undergo severe trauma and loss are said to go through the stages of denial, anger, bargaining, depression, and acceptance to come to terms with their grief (e.g. Kübler-Ross, 1966). These stages are widely acknowledged and coincide with numerous socially and religiously enforced time frames for the expression of different levels of grief, guiding the mourner back to life. In this point of view, the decline in the number of articles written on the tragedy, as well as the evidence of linguistic inhibition, is well-explained—repeated emotional writings about the tragedy would be socially inappropriate for accepted stages of grief and would thus be counterproductive. However, these stages of grief models have not taken into account how social prescription for certain individuals and societies can cause emotional inhibition, which in turn affects physical health.

Finally, the search for causes and explanations is apparent for both schools, increasing linearly throughout the entire study period. This is consistent with what Mackie (1974) called the "progressive localization of cause," which depicts an attempt to specify an explanation more and more over time, and replicates Hilton et al.'s (1992) finding that over time, newsprint reflects the search for causes, responsibility, and consequences within the community. More important, however, is the fact that Texas A&M, the school that was afflicted by the tragedy, used significantly more words of causation (e.g. because, effect, hence), reflecting their increased search for meaning. Speculating on this finding, it is important to keep in mind that a search for causes, as done in informa-

tion seeking and hypothesis generation, is a cognitive activity but is also driven by interpersonal and communication goals (Hilton et al., 1992). If causes of an accident are not established in an accurate and readable form, the general public may judge the university's investigation a failure, resulting in a loss of face for the campus community. Texas A&M's student newspaper, thus, had the greater burden to search for causes in the tragedy than the control school, making this finding very plausible.

It is also important to note that overall cognitive processes leveled out between Thanksgiving and Christmas in both student newspapers, increasing again after the Christmas holidays. After the students have returned to campus from the holidays, the process of meaning-making and searching for causes was taken up again. This increased search for meaning and causes after Christmas break coincides with improved health of the community. In fact, both total visits to the health center and visits to the medical clinic drop sharply in January 2000 and over the following months. One speculation is that members of the A&M community had time to distance and reflect over the break, thus their outlook on the tragedy could be renewed. Such findings confirm previous research (Pennebaker, 1993, Pennebaker & Francis, 1996) that the use of causal words when writing about trauma is linked to positive health changes.

The drastic drop in health center visits at Texas A&M in the months after the accident is an intriguing and potentially important finding. While a return to baseline in physician visits would have been expected, the finding that visits to the health center decreased by 17% in comparison to the previous year by February, 20% by March, and 50% by April was quite contrary to our expectations (see Figures 2 and 3). These results indicate that the Texas A&M community became significantly healthier during the months following the accident, not only in comparison to the previous year, but also in comparison to the control school.

According to most traditional stress models, the health center results do not make sense. However, the social support literature may provide an important key. It is well known that individuals who have a strong social support network are less likely to become ill in the weeks after a traumatic experience than people who do not have such a network (e.g., Cohen et al., 2001; Cohen & McKay, 1984). Indeed, studies of mental (as opposed to physical) health among residents of London during the Nazi bombardments in 1939 actually showed lower rates of neuroses than they did in the months prior to the bombardments (Lewis, 1942). The standard explanation for this effect is that the bombardments brought the city together and caused people to focus on the external threat without worrying about their internal state.

In the present study, it is clear that A&M exhibited a unique atmosphere of social support—especially in the shadow of the bonfire trag-

edy. Although A&M has long been known to be a tightly-knit social community, there is evidence that the bonfire helped to forge even stronger bonds of social support. Even the newspaper articles point to the tight social connections among the students. A&M's *The Battalion* consistently made more references to social processes—indeed social words were higher for A&M both before and in the months following the bonfire. Examples of social process words include words such as “friends,” “talk,” “family,” “we,” and “they”—markers of an awareness of and interest in other people. An example of the social connections appeared in a letter in *The Battalion*:

“Many of the out-of-town media outlets have referred to [us] with amazement and skepticism. How could these college students have this ridiculous level of pride and loyalty for their school and classmates? [...] The compassion and support I have witnessed in the past several days has touched me beyond belief. You should be proud that for a brief moment, the world stopped and tried to understand what it means to be an Aggie. Although they can never completely understand, the overflow of the Aggie spirit here has warmed their hearts... (David Lee, November 22, 1999, p. 7).

A fortified and united community in the face of a tragedy means more social support, more social disclosure, more sense of belonging, and better mental and physical health. It means being a small part of a large cohesive whole that can withstand tragedy.

It should be noted that several other overlapping explanations may help to explain the health center drops at A&M in the months after the bonfire. For example, cognitive dissonance may have been at play among A&M students who needed to justify their school's experience. An increase in collective focus and “Aggie Spirit,” as well as the increased search for cause and meaning described above, would thus become more entrenched in light of the tragedy, as the bonfire is challenged and questioned by the outside world. In addition, the bonfire may have simply caused students to redefine their thresholds for going to the doctor. That is, in light of the bonfire, they may have been less concerned with minor aches and pains and felt there was no need to trouble the medical community about these relatively insignificant health problems.

While this study presents a novel and informative way of looking at the psychological and physical health effects of a unique collective trauma, it has several limitations. First, this is a quasi-experimental study that has relied on pre-existing measures and communities. Finding an appropriate control group was challenging considering the

unique social nature of the A&M community. However, this study replicated similar studies on collective coping (e.g., Pennebaker & Harber, 1993; Stone & Pennebaker, 2002) while at the same time exploring the effects of trauma in a unique and tightly-knit community. Future studies could investigate similar tightly-knit communities to replicate the linguistic and health data found in this study.

Second, the way articles were determined to be bonfire- or nonbonfire-related was made by the simple criterion of whether or not the article contained the word "bonfire." This decision was made by the first author who was not blind to the hypotheses of the study. Finally, while the use of archival data can be an innovative way to study psychological phenomena, it limits the results to pre-existing data produced by certain individuals who at one point in their lives have decided to publish in a student newspaper or to visit the student health center. Using random sampling procedures in future studies to replicate these findings would constitute an excellent contribution to the study of collective trauma.

In sum, a community-wide tragedy generates a collective experience of shared trauma and grief. Linguistic analyses of collective writings in the afflicted community, in this case student newspapers, can provide evidence for such a phenomenon and its structure. Newspaper reports in the first days after the accident were rich in emotional content and reflected an increase in both self- and collective focus. However, patterns of social and psychological dynamics in the afflicted community were found in the following dimensions: The coverage became shorter on average (word count), a pattern of distancing and intellectualization surfaced (words larger than six letters), negative emotions and death-related writings quickly dropped, and cognitive mechanisms showed a pattern of distancing by leveling off in weeks one to three after the accident. Of particular importance was that markers of social cohesion were initially high at the affected school and became even higher in the days and weeks following the event. In many ways, the findings were consistent with the social stages model of coping as evidenced by the immediate increases in illness in the afflicted community. The following adaptation phase with its increased process of meaning-making and search for causes is reflected in an improvement in collective health. These patterns suggest that the social stages model of coping is evident not only in spoken word, but also in newspaper reports and the collective health within the community afflicted by tragedy.

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