Patterns of Natural Language Use: Disclosure, Personality, and Social Integration

James W. Pennebaker[1] and Anna Graybeal

Department of Psychology, The University of Texas, Austin, Texas

Abstract

When people write about their deepest thoughts and feelings about an emotionally significant event, numerous benefits in many domains (e.g., health, achievement, and well-being) result. As one step in understanding how writing achieves these effects, we have developed a computer program that provides a "fingerprint" of the words people use in writing or in natural settings. Analyses of text samples indicate that particular patterns of word use predict health and also reflect personality styles. We have also discovered that language use in the laboratory writing paradigm is associated with changes in social interactions and language use in the real world. The implications for using computer-based text analysis programs in the development of psychological theory are discussed.

Keywords

writing; language; therapy; health; social interactions

There is a long-standing belief in psychology that it is beneficial for people to have some degree of awareness about their own motives, goals, thoughts, and feelings. Some form of self-understanding has been the hallmark of most therapeutic approaches from Freud's psychoanalysis to more recent cognitive behavioral therapies. With few exceptions, the medium by which people come to alter their self-perceptions is language. That is, people report that by talking or writing about emotional and personal issues, they achieve a greater understanding of themselves.

About 15 years ago, we began exploring how writing or talking about traumatic or emotionally upsetting experiences could affect mental and physical health. In our studies, we simply asked people to write about traumatic experiences in the laboratory for 15 to 20 min a day for 3 to 4 consecutive days. As a comparison, participants in the control condition were asked to write about superficial topics for the same amount of time.

The results of this simple writing intervention have been remarkable. Compared with the control groups, people who spend 3 days of writing about their deepest thoughts and feelings about traumatic experiences make fewer physician visits for illness in the months after the writing sessions. This is true among both healthy and chronically ill individuals. Multiple labs have reported relative improvements in immune function, hormonal activity, and

other biological markers of stress or disease in the emotional relative to the control writing condition. Writing about emotional topics has also been linked to improvements in behavior, such as improved grades among college students and faster acquisition of new jobs among unemployed workers. These effects hold up across multiple cultures in Europe, North America, and Asia, and across social classes and personality types (for summaries, see Pennebaker, 1997; Smyth, 1998).

Writing about emotional topics is not a panacea. Across a wide range of studies, the average effect size in predicting objective health changes ranges from .45 to .70, a range similar to or larger than the ranges produced by other psychological treatments (cf. Smyth, 1998). Some people apparently benefit more than others; for example, males and people high in the traits of hostility and alexithymia (low awareness of emotional state) show particular benefits. The writing paradigm might be most effective for people who have experienced particularly traumatic experiences that are difficult to talk about with others.

WHY DOES WRITING ABOUT EMOTIONAL TOPICS IMPROVE HEALTH AND BEHAVIORS?

Like psychotherapy, the writing paradigm produces surprisingly wide and replicable effects. In recent years, several labs have been attempting to discover how such a simple procedure achieves its benefits. There is now sufficient evidence to suggest that the power of writing is not due to mere emotional expression in the sense of cathartic venting, or "blowing off steam." For example, participants who wrote only about their emotions about their most traumatic experience, without a description of the event itself, did not reap the benefits seen by those who both described the event and expressed their feelings about it (Pennebaker & Beall, 1986). Also, those who reported that writing served a cathartic function invariably had poorer health than other writers (Pennebaker, 1989).

Nor does writing about an emotional topic necessarily cause people to engage in healthier behaviors, such as smoking less, eating better, or jogging more. Rather, research at several labs suggests that writing or talking about emotional topics affects the ways people think about the trauma, their emotions, and themselves. For example, when participants are interviewed in the months after writing, they consistently say that the experiment changed the way they "thought about" the event (or events) or "made me realize why I felt the way I did." Also, it has been shown that writing reduces the frequency and impact of intrusive thoughts about the trauma (Lepore, Wortman, Silver, & Wayment, 1996).

A promising new direction for learning more about the cognitive changes produced by writing has emerged through our development of a comprehensive computer-based text analysis program, called Linguistic Inquiry and Word Count, or LIWC (Pennebaker & Francis, 1999). LIWC is basically a sophisticated word counter. It tabulates the numbers of words in different categories used in a text, providing a "fingerprint" of the language used by the writer. Thus, for any given text file, we are able to calculate the percentage of words that fall into various categories, such as emotion words (e.g., "happy," "sad," "angry," "joyful"), cognitive words (e.g., "realize," "understand," "think"), self-references ("I" and "we"), and up to 65 to 75 additional categories. Over the 7 years of development of the program, all of its subjective linguistic categories were assessed and validated by independent groups of raters. The final product allows us to explore how language is used during expressive writing and, as we discuss later, how language is subsequently used in the real world in the weeks after writing.

LANGUAGE USE AS A MARKER OF COGNITIVE PROCESSES, PERSONALITY STYLE, AND SOCIAL INTEGRATION

Through the analysis of different types of text samples—from both written and spoken sources—it is possible to explore people's use of language in a variety of situations and then relate their language use to many aspects of their experience, such as their cognitive functioning, personality, and social lives. This work is beginning to suggest that the cognitive changes brought about by writing subsequently affect people's social interactions and relations with others.

Language as a Marker of Cognitive Processes

One of our first goals was to learn if word choice in writing predicts physiological changes and health. In the initial test of this idea, experimental writing samples from 177 participants in six earlier writing studies were analyzed by LIWC. Counter to our original predictions, use of emotion words was only weakly related to health, with use of positive emotion words being correlated with health improvement and use of negative emotion words showing no simple linear relation to health outcome. A far more powerful predictor of health was the use of cognitive words over the days of writing. That is, individuals who showed an overall increase in the use of causal words (e.g., "because," "cause," "reason") and insight words (e.g., "real-

ize," "know," "understand") demonstrated comparatively larger and more significant health improvements than those who did not increase their use of causal words (Pennebaker, Mayne, & Francis, 1997). A later study exploring word use and immune system activity after the writing experience replicated these effects (Petrie, Booth, & Pennebaker, 1998). Because LIWC is unable to capture the meaning of text, further study is necessary to explain why the use of causal and insight words is beneficial. Such studies are ongoing; for example, we are currently testing the idea that these words characterize good stories, reasoning that it is the formation of such stories that results in writing's benefits.

The beauty of the computerized analysis of writing samples using LIWC is that it provides a relatively simple and straightforward picture of how individuals are thinking as they write about deeply personal events. Indeed, we began to see that language may serve as a marker of a wide variety of individual differences, in both personality style and cognitive processing.

Linguistic Styles: Individual Differences in Language Use and Health

We have recently been examining the ways individuals use language over time and across contexts. As Allport (1961) noted, individuals have their own unique stylistic behaviors, such as the ways they walk, dress, or smile. It follows that they would have characteristic ways of expressing themselves in language. These linguistic styles, then, could be considered stable individual differences or personality styles. To study this, we used LIWC to analyze daily diary entries written by 15 substance abuse patients during their first weeks of treatment, 2 weeks' worth of daily assignments written by 35 summer school students, and 15 journal abstracts from each of 40 social psychologists who were members of the Society of Experimental Social Psychology. We found evidence for stable linguistic styles in that most language variables showed modest, but reliable, consistency across time and context. That is, a person who uses first-person singular, past tense, or causal language in one writing assignment or journal abstract will tend to use the same linguistic categories to the same degree in other writing samples (Pennebaker & King, 1999).

We next wondered whether linguistic styles would be associated with other measures of personality and, more important, with other real-world behaviors. Across several large samples, we found that language use is poorly correlated with traditional five-factor personality dimensions derived from self-report questionnaires. For example, the neuroticism (or anxiety) dimension correlates only .16 with use of negative emotion words. However, analyses of four writing assignments from more than 1,200 students showed that language use is reliably correlated with physical health, alcohol use, and grades in school. Indeed, language use correlates with real-world behaviors at least as highly as many traditional personality dimensions do. One clear implication is that linguistic styles can be considered to be markers of people's personality in ways that are independent of personality questionnaires (Pennebaker & King, 1999).

Language as a Marker of Social Integration

The ultimate purpose of language is to communicate ideas and thoughts with other people. The fact that writing about emotional topics can improve health suggests that talking about emotional topics with other people serves the same purpose. Talking to others about personal experiences ultimately serves two functions. The first, which we have seen in our writing studies, is helping the person come to some cognitive understanding of the event. The second is social: When someone talks to other people about his or her experiences, it alerts them to the person's psychological state and, ultimately, allows him or her to remain socially tied to them. Conversely, people who have traumatic experiences and do not tell their friends are more likely to live in a detached, isolated state.

Talking about emotional experiences, then, can help people to become more socially integrated with their social networks (cf. Durkheim, 1897/1951). In a recent test of this idea, Matthias Mehl and the first author asked a group of 52 students to wear a computerized tape recorder, called an electronically activated recorder (EAR), for 2 days. Two weeks later, the participants were asked to write about either emotional or superficial topics for 3 days. Two weeks after writing, they again wore the EAR for 2 days. Using this system, we were able to determine how the students used language in talking with others in their social networks. Preliminary analyses show that the writing manipulation changed the ways that individuals interacted with others. There were significant changes in patterns of speaking, use of self-references, and use of positive emotion words. These data are the first to demonstrate that writing about emotional topics ultimately brings about changes in objective social and linguistic behaviors in the real world (for conceptually similar results, see Finkenauer & Rimé, 1998).

CHALLENGES FOR THE FUTURE

In the past 15 years, research on the writing paradigm has blossomed in many directions. Whereas the early studies found that writing about emotional topics improves physical health, later studies showed that the benefits extend to a wide range of domains and behaviors. One current challenge is to pinpoint how writing produces its benefits. The most promising avenue suggests that writing causes cognitive changes. Future research should be directed at determining the steps by which this happens and how the cognitive changes then lead to improved health.

To us, what has been equally exciting is that this relatively simple paradigm has provided a gateway through which we are starting to observe the remarkable effects and correlates of natural language use. With the aid of computerized text analyses, we can summarize tremendously varied and complex language samples quickly and efficiently—with an eye toward a better understanding of basic cognitive, social, developmental, and personality processes. Computerized text analysis brings psychologists to the point where we can begin to explore the psychology of natural language across most domains of daily life.

Somewhere between psycholinguistics, cognitive psychology, and social psychology is a world of everyday language that both reflects and affects every feature of individuals' social, emotional, and cognitive worlds. Our research indicates that individuals have their own styles of language use, that the everyday use of language correlates with markers of health and social behaviors, and that language use may reflect some basic cognitive mechanisms that could be far more revealing about human nature than some of the traditional measures used in psychology, such as reaction time tests or self-report questionnaires. Word-counting strategies, such as LIWC, are shamelessly crude in that they ignore syntax, context, and linguistic devices such as irony and sarcasm. However, in the years to come, we anticipate the development of far more powerful language analysis programs that will provide much richer insights into people's social and cognitive lives.

Recommended Reading

Davison, K.P., Pennebaker, J.W., & Dickerson, S.S. (2000). Who talks: The social psychology of support groups. *American Psychologist*, *55*, 205–217.

Pennebaker, J.W. (1997). *Opening up: The healing power of expressing emotion*. New York: Guilford Press.

Smyth, J.M., Stone, A.A., Hurewitz, A., & Kaell, A. (1999). Effects of writing about stressful experiences on symptom reduction in patients with asthma or rheumatoid arthritis: A randomized trial. *Journal of the American Medical Association*, *281*, 1304–1309.

Acknowledgments—The research reported in this article was funded, in part, by a grant from the National Institutes of Health (MH52391).

Note

1. Address correspondence to James W. Pennebaker, Department of Psychology, The University of Texas, Austin, TX 78712; e-mail: pennebaker@psy.utexas.edu.

References

Allport, G.W. (1961). *Pattern and growth in personality*. New York: Holt, Rinehart and Winston.

Durkheim, E. (1951). *Suicide* (J.A. Spaulding & G. Simpson, Trans.). New York: Free Press. (Original work published 1897)

Finkenauer, C., & Rimé, B. (1998). Socially shared emotional experiences vs. emotional experiences kept secret: Differential characteristics and consequences. *Journal of Social & Clinical Psychology*, *17*, 295–318.

Lepore, S.J., Wortman, C.B., Silver, R.C., & Wayment, H.A. (1996). Social constraints, intrusive thoughts, and depressive symptoms among bereaved mothers. *Journal of Personality and Social Psychology*, *70*, 271–282.

Pennebaker, J.W. (1989). Confession, inhibition, and disease. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 22, pp. 211–244). New York: Academic Press.

Pennebaker, J.W. (1997). Writing about emotional experiences as a therapeutic process. *Psychological Science*, *8*, 162–166.

Pennebaker, J.W., & Beall, S.K. (1986). Confronting a traumatic event: Toward an understanding of inhibition and disease. *Journal of Abnormal Psychology*, *95*, 274–281.

Pennebaker, J.W., & Francis, M.E. (1999). *Linguistic Inquiry and Word Count (LIWC): A computer-based text analysis program*. Mahwah, NJ: Erlbaum.

Pennebaker, J.W., & King, L.A. (1999). Linguistic styles: Language use as an individual difference. *Journal of Personality and Social Psychology*, *77*, 1296–1312.

Pennebaker, J.W., Mayne, T.J., & Francis, M.E. (1997). Linguistic predictors of adaptive bereavement. *Journal of Personality and Social Psychology*, *72*, 863–871.

Petrie, K.J., Booth, R.J., & Pennebaker, J.W. (1998). The immunological effects of thought suppression. *Journal of Personality and Social Psychology*, *75*, 1264–1272.

Smyth, J.M. (1998). Written emotional expression: Effect sizes, outcome types, and moderating variables. *Journal of Consulting & Clinical Psychology*, *66*, 174–184.