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The Bitter-Sweet Labor of Emoting: The Linguistic Comparison of Writers and Physicists

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ABSTRACT: In this exploratory archival study, the motivation of writers of fiction and physicists was examined by studying word usage as a clue to unconscious motivators of their work. The hypothesis was that artists make art to deal with issues in their own lives, thus relying on emotions, particularly negative emotions (markers of presence of issues), to govern their work. Consequently, it was predicted that distinguished writers of fiction, as compared to distinguished physicists, would use more emotion-related words when discussing their work, particularly negative emotion-related words. Interviews conducted with 9 physicists were matched to the interviews with 9 writers, and analyzed using the Linguistic Inquiry and Word Count (LIWC) program (Pennebaker, Francis, & Booth, 2001). Writers used significantly more emotion-related words, in particular more negative-emotion words, including the greater use of anger-related, anxiety-related, and depression or sadness-related words. Almost identical results were obtained when the 9 physicists were compared to the nonmatched, larger sample of 124 writers. The study implies differences of inner preoccupation (relating to work) between creative people oriented towards literary art and physical science.

> You put the question to human nature—and especially to your own nature—and see what comes out.
>
> Robert Penn Warren

The nature of differences between artistic and scientific endeavors has been often investigated by psychologists. Research has particularly focused on personality differences between artists and scientists (Caraca, Loura, & Martins, 2000; Feist, 1999; Feist, 1998; Guastello & Shissler, 1994; Kumar, 1984; Sheldon, 1994) and commonality in cognitive processes underlying both scientific and artistic production (Feist, 1991; Perkins, 1981; Root-Bernstein & Root-Bernstein, 2004; Simon, 2001; Smith, 2005). The focus of this study is an examination of artistic *motivations*, of the reasons underlying a unique tendency of some individuals to focus their activity on artistic, rather than some other creative endeavor. The "Why?" of art, however, appears more difficult to study than the "How?"

Studying artistic motivation, much like studying motivation in general, is confronted by pragmatic obstacles. Artists, especially well-known artists, generally do not volunteer to come to psychological laboratories, submit themselves to interviews, fill out questionnaires, or run through extensive experiments. It is also possible that, for artists, direct questioning about their motivations might arouse the common defense mechanisms everyone shares. Not all is lost, however, in an attempt to gain insights about motivations that compel production of art by conversing with artists. One's language expresses much more than one intends, as Freud argues in his *Psychopathology of Everyday Life* (1965/1901), and errors in the usage of natural language can reveal unconscious motivations. An underlying assumption on which this study has been

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built is that word usage can give clues as to motives. This assumption has been steadily supported by independent research.

A precondition for treating word usage as a psychometric predictor is its stability across time and contexts. This has been show in several studies. (Gleser, Gottschalk, & Watkins 1959; Mehl & Pennebaker 2003; Mehl, Pennebaker, Crow, Dabbs, & Price, 2001; Pennebaker & King, 1999; Schnurr, Rosenberg, Oxman, & Tucker, 1986). In addition, much research has shown that word usage can indicate natural, social, and personality processes, including motivations (Pennebaker, Mehl, & Niederhoffer, 2003).

The task of this exploratory study was to attempt to understand motivational forces affecting artistic production by studying words writers use when they talk about their work, in particular by textual analysis of interviews with distinguished literary writers as they discussed their work. Interviews with award-winning writers were compared to interviews with award-winning physicists, thus at least partially controlling for the potential confounds with creativity, intelligence, and success. Clearly, the word usage in the studied interviews depends on the questions asked, and this potential confounding variable was controlled empirically (see Procedure section).

An underlying question in this study concerns the possibly unique role of art, and the possibly unique difference between artistic and scientific endeavors. Though scientists seek creative solutions to capture laws that govern nature, many artists seem to seek creative solutions to problems *within their own nature, and by extension, within human nature.* This hypothesis becomes clearer in the context of centuries-long link between art and emotion. Averill (2005) argued for a close link between emotions and creativity, in which emotions can act as mediators and products of creative process. He adds to strong arguments countering the more simplistic Romantic idea of art as only *expressing* emotion (Oatley, 2003). If weeping expresses emotions as well as, or perhaps better than, writing a poem, why write a poem? The answer might lie in the *functional* nature of emotion and the *dynamic* nature of art.

Theorists of emotion have long maintained that emotion arises when life presents one with either markers of progress toward the goal (positive emotions) or markers of problems (negative emotions). Emotions seem to be symptoms of life's vicissitudes (Oatley, 1992). But inherent in them is also readiness for action (Frijda, 1988). It is this potential of emotion both to signal the presence of challenges and to motivate action that keeps individuals who experience it motivated to search for solutions. Unlike weeping, making art is a dynamic symbolic action that not only *expresses*, but *explores*, and sometimes *resolves* the challenges that present themselves to the artist. According to this view, the emotional challenges that compel some writers to write will become apparent in their language when they are asked about their work.

The hypothesis in this exploratory study is that language used by artists and scientists (when interviewed about work), controlled for potential confounding variables, will differ significantly in the usage of emotion words. It is predicted that writers will use significantly more emotion words in discussing their work than physicists. Furthermore, if writers' motivation stems from unresolved emotional issues in their own lives that they address in writing, a much larger effect for negative emotions than for positive emotions can be anticipated.

Method

Selection of Participants

The most exhaustive pool of interviews with distinguished writers can be found in series *Writers at Work* (Cowley, 1953)—originally published by the literary magazine *Paris Review,* starting in 1953. Over the years, due to their popularity, numerous interviews were collected in several books (the ninth volume, edited by George Plimpton, was published in 1992). In the first nine volumes, 124 well-known literary writers discuss their work, daily work routines, sources of ideas, links to their colleagues, and other related issues. This pool of interviews was used both in its entirety, and as a pool from which to choose a subsample of nine writers that would be matched with nine physicists in the scientist sample.

The control group consisted of interviews with award-winning physicists, who were assumed to be as creative and as intelligent as the award-winning writers. The interviews were taken from the book *Genius Talk: Conversations with Nobel Scientists and Other Luminaries* by Brian (1995). This set of interviews was

selected because the style of interviewing was similar to that used by the *Paris Review* interviewers. (Similarity was controlled empirically, as described in the Procedure section.) Due to the limited number of physicists (nine) with whom the interviews qualitatively similar to those conducted with writers were done, and the necessity of carefully controlling for several potential confounding variables, a subsample of nine of the available 124 writers was chosen, to match the nine physicists. To ensure the representativeness, additional analyses were conducted comparing nine scientists to the whole sample of 124 writers.

To compare the language of writers and physicists, potential confounding variables, such as gender, country of origin, age of birth, all of which can impact on language, were controlled as well as possible. For this reason, nine physicists and nine writers who matched most closely on these variables were selected. Because the writers and scientists will be treated statistically as two groups with pooled means, they were not matched individually to each other, but group-wise. The complete list of the writers, scientists, and variables matched across groups is shown in Table 1.

All writers and physicists in these groups were men born between 1902 and 1933. In each group five were born in the United States, one in the United Kingdom, and three in continental Europe.

Text-Analysis Program

The tool used to explore the differences in language between writers and physicists was computerized text analysis program developed by Pennebaker and his colleagues (2001)—the Linguistic Inquiry and Word Count (LIWC) program. The program takes each word of a text file and categorizes it across 73 output variables. Each output variable is organized hierarchically under the following thematic headings: Linguistic dimensions (e.g., prepositions, articles, pronouns), Psychological processes (e.g., emotional, cognitive, sensory, social), Personal concerns (e.g., occupation, leisure, metaphysical issues), Relativity (e.g., time, space, motion), and Experiential dimensions (e.g., swear words, nonfluencies, fillers). The results for the text file are then given as a percentage of the words in each category in the text file. The focus of this study was output variables that are subsumed under the Psychological Processes and Personal Concerns headings, shown in Table 2.

Although some output variables are more general whereas others are more specific, general variables are not simply the summaries of the more specific ones, that is, they contribute independent information in an analysis. For example, Positive Emotions category has 261 words that would be recognized in the text as belonging to it. On the other hand, Positive Feelings (as a subcategory) and Optimism and Energy (as a subcategory) are more specific with 43 and 69 words, respectively. So the Positive Emotions output variable contains words belonging to Positive Feelings, and to Optimism and Energy, plus an additional 149 words that do not belong to these two subcategories. The hypothesis was tested using variables in Affective or Emotion-Processes categories and subcategories of the LIWC (please refer to the Table 2). Data generated by analysis comparing output variables in other categories and subcategories across the two groups of participants will be reported as exploratory data.

Table 1. *Names, Gender, Year, and Country of Birth for All Participants*

Writers				Physicists			
Name	**Gender**	**Year of Birth**	**Country of Birth**	**Name**	**Gender**	**Year of Birth**	**Country of Birth**
Georges Simenon	M	1903	Switzerland	Paul Dirac	M	1902	United Kingdom
Isaac Bashevis Singer	M	1904	Poland	Hans Bethe	M	1906	France/Germany
Alberto Moravia	M	1907	Italy	Victor Weisskopf	M	1908	Austria
John Gardner	M	1912	United States	John Wheeler	M	1911	United States
Arthur Miller	M	1915	United States	Charles Townes	M	1915	United States
Anthony Burgess	M	1917	United Kingdom	Richard Feynman	M	1918	United States
James Jones	M	1921	United States	Arthur Schawlow	M	1921	United States
William Styron	M	1925	United States	Robert Jastrow	M	1925	United States
Philip Roth	M	1933	United States	Arno Penzias	M	1933	Germany

Table 2. *Summary of LIWC Output Variables Used in the Analyses (Pennebaker et al., 2001)*

Psychological Proceses	Personal Concerns
Affective or emotional processes	Occupation
1. Positive Emotions	1. School
a. Positive Feelings	2. Job or work
b. Optimism and energy	3. Achievement
2. Negative emotions	Leisure activity
a. Anxiety or fear	1. Home
b. Anger	2. Sports
c. Sadness or depression	3. Television and movies
Cognitive processes	4. Music
1. Causation	Money and financial issues
2. Insight	Metaphysical issues
3. Discrepancy	1. Religion
4. Inhibition	2. Death and dying
5. Tentative	Physical states and functions
6. Certainty	1. Body states, symptoms
Sensory and perceptual processes	2. Sex and sexuality
1. Seeing	3. Eating, drinking, dieting
2. Hearing	4. Sleeping, dreaming
3. Feeling	5. Grooming
Social processes	
1. Communication	
2. Other references to people	
3. Friends	
4. Family	
5. Humans	

Note. LIWC = Linguistic Inquiry and Word Count.

Procedure

For each of the 18 interviews the text of the questions was separated from the text of the answers and placed into two different files. Then the four separate text-files were created from the 18 available: pooled questions posed to writers, pooled questions posed to scientists, pooled answers by writers, and pooled answers by scientists. Though the latter two text files were used to test the hypothesis, the first two files that include questions used by interviewers were analyzed as well, to make sure that the content of questions across two groups was empirically comparable.

Of the 44 output variables (relating to psychological processes and personal concerns), 5 were excluded based on the significant difference found between the content of questions posed to writers and the content of questions posed to scientists. In particular, questions posed to writers contained more words related to feeling (e.g., touch, hold, felt), $t(16) = 3.03$, $p < .01$,* more words related to references to other people (e.g., first person plural, second, third person pronouns), $t(16) = 2.35$, $p < .05$, more words related to leisure (e.g., house, television, music), $t(16) = 2.34$, $p < .05$, fewer words related physical states and functions (e.g., ache, breast, sleep), $t(16) = -2.13$, $p < .05$, and fewer words related to sleeping and dreaming (e.g., asleep, bed, dreams), $t(16) = -2.36$, $p < .05$, than questions posed to physicists. The variables that were thus excluded from the main analysis were shaded gray in the list of output variables in Table 2.

Results

Descriptive statistics for eight emotion-related output variables necessary for testing the hypothesis are presented in Table 3. Numbers indicate percentages of LIWC dictionary words in the text belonging to a particular category. The table also includes examples of LIWC dictionary words in each category or subcategory (Pennebaker et al., 2001).

The directional hypothesis that writers use more emotion-related words than physicists when interviewed about their work was confirmed. Writers used significantly more emotion words ($M = 3.20$) than physicists ($M = 2.68$), $t(16) = 1.83$, $p < .05$. The results for all emotion-related word categories are presented in Table 4. (To ensure representativeness of the subsample, the results of the comparison of the sample of physicists to the sample of all writers from *Writers at Work* series [$N = 124$], were reported in italics, underneath the results for the nine writers that were matched with scientists.) Except for the difference in the most general category (affective processes), the results for the subsample and the whole sample of writers were identical regarding significance of differences between writers and scientists.

In accordance with the predictions, writers used more negative emotion words in general, and more words related to anxiety or fear, anger, and sadness and depression in particular. As for positive emotions, the situation was more complex. Writers did not use more positive emotion words in general, nor more optimism and energy words in particular than physicists, but they did use significantly more positive feelings words. Overall, the greater number of emotion words used by

Table 3. *Descriptive Statistics for Eight Emotion-Related Variables*

Variable	Examples of Words	*M*	*SD*
Affective processes	*happy, ugly, bitter*	2.94	.64
Positive emotions	*happy, pretty, good*	1.96	.37
Positive feelings	*happy, joy, love*	.26	.10
Optimism and energy	*certainty, pride, win*	.48	.15
Negative emotions	*hate, worthless, enemy*	.96	.42
Anxiety or fear	*nervous, afraid, tense*	.14	.08
Anger	*hate, kill, pissed*	.27	.21
Sadness or depression	*grief, cry, sad*	.18	.10

Note. $N = 18$.

writers rather than physicists can be explained by the higher usage of negative emotion words.

During the exploratory part of the analysis, the differences between the writers and physicists on the rest of the variables in Table 2 were examined. Given that the number of variables (31) was large, there was 79.6% chance of finding at least one significant effect at the .05 level purely by chance. *P* values were therefore corrected using Bonferroni adjustment to .0016 to maintain a family-wise *p* level of .05. The exploratory analysis yielded the following results. Based on two-tailed *t* tests writers used significantly more words related to death than physicists—$M_w = .14$ vs. $M_p = .05$, $t(16) = 3.05$, $p < .0016$, as well as more words related to sex—$M_w = .13$ vs. $M_p = .02$, $t(16) = 3.92$, $p < .0016$.

Discussion

What does it mean that writers use more emotion words, particularly more negative emotion words than physicists? It does not mean that writers were more emotional at the time of the interviews than are physicists. Pennebaker and his colleagues (2003) warned rather specifically against this misconstrual. In their words, "it is striking how weakly emotion words pre-

Table 4. *Results of* t *Tests for Eight LIWC Emotion-Related Categories of Words Comparing Nine Physicists With a Matched Subsample of Nine Writers and a Nonmatched Full Sample of 124 Writers (in italics)*

	Writers		Physicists				
Variable	*M*	SD	*M*	*SD*	*T*	*p*	R^2
Affective processes	3.20	.61	2.68	.60	1.83	.043*	.17
	2.90	.60			*1.09*	.137	*.01*
Positive emotions	1.96	.34	1.95	.41	.01	.495	.00
	1.81	.39			*–1.06*	*.147*	.01
Positive feelings	.32	.08	.19	.07	3.92	.001**	.49
	.33	.13			*3.37*	.001**	.08
Optimism and energy	.51	.10	.45	.19	.83	.209	.04
	.43	.15			*–.33*	.369	*.00*
Negative emotions	1.22	.40	.70	.26	3.26	.003**	.40
	1.06	.33			*3.27*	.001**	*.08*
Anxiety or fear	.18	.04	.09	.08	2.85	.006**	.34
	.17	*.10*			*2.74*	.003**	.05
Anger	.39	.22	.15	.10	2.97	.005**	.36
	.30	*.15*			*2.91*	.002**	.06
Sadness or depression	.23	.07	.14	.12	1.92	.037*	.19
	.23	.10			*2.58*	.006**	*.05*

Note. $N = 18$, $N = 124$ (italics). All *t* tests are directional. LIWC = Linguistic Inquiry and Word Count.
$^*p < .05$. $^{**}p < .01$.

dict emotional state" (p. 571). If emotion words do not predict emotional states, what do they predict? Here, psychoanalytic interpretation (Freud, 1901; Jung, 1971; Lacan, 1968) can be employed satisfactorily: Word usage can reveal unconscious preoccupations. It is on this assumption that the hypothesis in this exploratory study hinges. It is our view that writers used more emotion-related words when asked about their work because writers' work is *suffused* with these emotions, particularly negative emotions, and that these emotions indicate unresolved issues that writers battle using their preferred weapon—the pen (or more recently, the word processor)—to resolve them.

Of course, there are alternate explanations of the data. Perhaps the sample of writers was on average more depressed than the sample of physicists. After all, some researchers (i.e., Jamison, 1994) have shown a strong link between creative artists and unipolar and bipolar mood disorders, including suicidality. A tendency has been reported in the literature for a high rate of depression and suicide in female poets, but not for prose writers and not for males (Kaufman & Baer, 2002). In this sample of writers (seven of whom are dead) no one took his own life, although that does not necessarily exclude the presence of depression and suicidal ideation. The possibility that the writers in this sample were more depressed does not seem to be borne out. The variable most closely related to depression and suicidality in studies of this kind is not higher use of negative emotion words, but the elevated use of first person singular words (Bucci & Freedman, 1981; Rude, Gortner, & Pennebaker, 2002; Stirman & Pennebaker, 2001; Weintraub, 1981). In this study, both writers and physicists were equally likely to use the first person singular, and this may suggest that the depression and suicidality of two groups were on an approximately equal level.

Even though there were, according to this measure, no differences in depression between writers and scientists, it is possible that a generally higher negative emotionality occurs in artists as compared with scientists (Barron, 1963, 1969; Cross, Cattell, & Butcher, 1967) may serve a purpose. Sheldon (1994) argued, based on his research results, that some individuals might choose artistic rather than scientific endeavor because artistic vocation provides a culturally sanctioned means of remaining preoccupied with one's emotional life. This study is correlational and thus does not illuminate the directionality of the process being discussed. On one hand, artists might become more preoccupied with emotions in service of their art, or they might choose to become artists to remain preoccupied with their emotions. Regardless of the direction, artistic motivation and emotions remain closely linked.

It is necessary to emphasize that this single exploratory study is suggestive rather than conclusive. It is proposed as a step in testing the question of what may be distinctive about artists, and the question of whether the subject matter of art is frequently, or perhaps necessarily, about emotions. Though enthusiastic about this step and its potential implications for the presented hypotheses, we look optimistically toward many minds, utilizing various methodologies, dedicated to empirical elucidation of artistic motivations.

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