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Hannah J. Dean , Ryan L. Boyd

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Highlights

- Automated text analysis can help develop robust and accurate psychological profiles
- Analyses of Poe's works indicate depressive episodes that coincide with tragic life events
- LIWC2015 shows relevance for identifying affective pathology in clinical settings

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Deep into that Darkness Peering: A Computational Analysis of the Role of Depression

in Edgar Allan Poe's Life and Death

Hannah J. Dean¹ & Ryan L. Boyd²

¹The University of Texas at Austin, USA

²Lancaster University, United Kingdom

Correspondence can be sent to the authors via e-mail: hannah.dean1@utexas.edu and r.boyd@lancaster.ac.uk.

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Abstract

Background: To help shed light on the peculiar circumstances surrounding the death of the famed macabre and mystery writer, poet, editor, and literary critic, we explored the potential role of depression in the life and death of Edgar Allan Poe via his written language.

Method: Using computerized language analysis, we analyzed works from Poe's corpora of personal letters ($N = 309$), poems ($N = 49$), and short stories ($N = 63$), and investigated whether a pattern of linguistic cues consistent with depression and suicidal cognition were discernible throughout the writer's life, particularly in his final years. Building on past work, language scores were collapsed into a composite depression metric for each text. Data from each work type was subsequently compiled and graphed into a single plot by year, with scores exceeding the 95th percentile ($p < .05$) considered statistically significant and treated as potential depressive episodes.

Results: Significant, consistent patterns of depression were not found and do not support suicide as a cause of death. However, linguistic evidence was found suggesting the presence of several potential depressive episodes over the course of Poe's life – these episodes were the most pronounced during years of Poe's greatest success, as well as those following the death of his late wife.

Limitations: Given the sampling method, it is not possible to establish direct causality; results should be considered informed but tentative.

Conclusion: This investigation demonstrates the utility of language analysis for capturing disruptive/maladaptive emotional responses to life events.

Keywords: Edgar Allan Poe, LIWC, depression, suicide, digital humanities

Deep into that Darkness Peering: A Computational Analysis of the Role of Depression in Edgar Allan Poe's Life and Death

Famed American macabre and mystery author, poet, editor, and literary critic, Edgar Allan Poe died on October 7th, 1849 after spending 4 days hospitalized in a curious state of delirium. To date, Poe's death remains an unsolved enigma. Alcohol withdrawal (Bramsback, 1970; Francis, 2010), murder (Miller, 1977), and various afflictions ranging from carbon monoxide poisoning (Otterbein, 2013) to a brain tumor (Pearl, 2007) have been hypothesized as potential reasons for his untimely passing. One of several plausible, yet scientifically unexplored, explanations for Poe's death, however, is that he may have taken his own life.

While a great deal has been written about Poe, several aspects of his life and death may be made clearer via the modern tools of empirical psychology, particularly those that can be used to study the individual via their language. In the current study, we apply a modern psychological text analytic method, Linguistic Inquiry and Word Count (LIWC), to the personal and professional writings of Edgar Allan Poe. Building upon past research on the linguistic markers of depression, we provide a novel analysis of Poe's psychology spanning his youth up to his death, enabling unique insights into his psychological states throughout the course of his life.

The Life and Death of Edgar Allan Poe

Edgar Poe was born in Baltimore, Massachusetts, on January 19, 1809, to parents Elizabeth and David Poe, who were traveling actors. Later that same year, David Poe deserted his family, leaving his wife, eldest son Henry, Edgar, and later, Rosalie to their own devices (Quinn, 1941). In 1811, Elizabeth Poe passed away from tuberculosis, which she contracted

while pregnant with Edgar; David Poe followed in death a mere 3 days later. Following the death of their parents, the Poe children were separated. Edgar was adopted by the childless John and Frances “Fanny” Allan of Richmond, Virginia; he was later christened as who we now know as “Edgar Allan Poe.” Though Frances Allan was known to dote on Edgar, John Allan was often cold and unaffectionate, resulting in high tensions between him and his adoptive son (Kennedy, 2001).

By the age of 18, Poe began writing poetry and, over the next 20 years, would become one of the most well-known and celebrated American authors, particularly for his work in the horror genre. Perhaps his most notable publications include “*The Gold-Bug*” (1843), an early detective mystery about hidden treasure, and “*The Raven*” (1845), a poem in which a man mourns the loss of his love, Lenore. These works granted Poe national recognition almost overnight (Hoffman, 1998). The eloquence with which Poe paired macabre themes and his unique writing style have historically distinguished his works from those of any other American author.¹

Depression in Poe’s Life

Though Poe was inarguably a prolific author, he was known to have suffered from regular bouts of severe depression (Tomc, 2002). His well-documented propensity towards melancholy and caprice has often been accompanied by accounts of his alcoholism and drug use (Teive, Paola, & Munhoz, 2014). These accounts have implied that Poe had a particularly low tolerance for alcohol, noting that his consumption of it (or withdrawal from it) would intensify his already unpredictable behavior (Marcelo, 2007). In other words, Poe tended to oscillate between pathological behaviors and unhealthy coping strategies that would only serve to

exacerbate them. Though the precise etiology of Poe's depression is unknown, one can speculate about the environmental factors that served to inflame his natural predisposition towards psychopathology and inspire his fascination with the macabre.

Death and disease were recurring elements in Poe's life and, subsequently, in his work. The sudden death of Elizabeth and David Poe in 1811 haplessly rendered 2-year-old Poe and his siblings orphans, forcing them to reside among different households. A large body of research suggests that the effects of Poe's separation from his siblings and the bereavement he experienced early in his childhood would likely have had detrimental implications for his adult psyche (Hill & Price, 1967; Orvaschel, Weissman, & Kidd, 1980).

Poe was also deeply troubled by the passing of his adored foster-mother, Frances Allan, in 1829; Frances's death left a lasting and painful impression on the author.² It can be argued that her passing served as one of the most fundamental inspirations for Poe's dreary, yet heavily romanticized, outlook on the fragile nature of beautiful women (Weekes, 2002). This somber theme became famously attributed to Poe, appearing in several of his written works.³ It is evident in his writings that Poe carried the weight of Frances Allan's death throughout the remainder of his life.

Likely the most traumatizing death for Poe however, was the loss of his beloved cousin and wife Virginia Clemm Poe in 1847 (Quinn, 1941). Like his biological mother and older brother, Virginia succumbed to tuberculosis, a bacterial disease of the lungs that causes its victim to cough up blood and struggle to breathe. In the years leading up to Virginia's passing, Poe's writings evolved to be overtly grotesque and centered on death.⁴ It is apparent in his works that Poe's life after Virginia's death was imbued with an unrelenting sense of grief. Poe became increasingly reliant on alcohol, as evidenced in an 1848 report where he was jailed for public

intoxication (Kennedy, 2001). Moreover, he began to act recklessly in his personal relationships, proclaiming love for a series of women and attempting to coax them into marriage (Giammarco, 2013). The death of Virginia Poe affected the author beyond the level of typical spousal bereavement, likely due to the volatile nature of her illness as well as psychological complications caused by Poe's preexisting struggles with depression (Stroebe, Schut, & Stroebe, 2007). The compounded trauma Poe experienced due to recurring personal deaths, particularly among the women in his life, rendered his psychological state exceptionally vulnerable to depression (Shulman, 1997).

Additionally, Poe's tumultuous and detrimental relationship with John Allan acted as a persistent stressor in his life. Although Allan and Poe initially shared an affectionate father-son relationship, the pair's personality differences and constant quarrelling over money would eventually damage it irreparably.⁵ Allan's fondness for Poe faded in the latter's adolescent years as his emerging headstrong nature was met with blatant distaste. Over time, their relationship grew increasingly strained and distant – Allan's callousness towards Poe contributed to his state of impoverishment during his university days and afterward. His restricting of funds also influenced Poe's decision to join the military, a decision which Poe would later come to regret. One can surmise that Edgar Allan Poe's defective relationship with John Allan and its financial detriments played a role in generating Poe's state of psychological turmoil (Barnett, Marshall, & Pleck, 1992).

Theories About Poe's Death and the Case for Suicide

The puzzling death of Edgar Allan Poe has been explored repeatedly in the scientific and medical literatures. Several established theories cite Poe's alcoholism and drug use as the

harbingers of his death via either prolonged abuse or fatal withdrawal (Bramsback, 1970; Francis, 2010). Other interesting and viable hypotheses include deadly lung infection (Ackroyd, 2008), brain hemorrhaging caused by previous head trauma (Patterson, 1992), and syphilis (Gordon, 1997). However, other evidence supports a *psychosocial* cause for Poe's death – namely, major depression leading him to take his own life.

As discussed above, Poe had a detailed history of depression and often exhibited emotionally unstable behavioral patterns. Researchers have established a firm link between depression and an increased risk of death by suicide (Bachmann, 2018; Turecki & Brent, 2016; U.S. Department of Health and Human Services, 2014). Several other life factors have been found to increase one's likelihood of successfully committing suicide, including being of male sex and exhibiting comorbid alcohol and substance abuse behaviors—both of which relate to Poe (Hawton, Casañas i Comabella, Haw, & Saunders, 2013). Poe's exposure to recurrent traumatic death placed him even further in jeopardy of taking his own life (Shulman, 1997), as did the tensions between Poe and John Allan and the financial turmoil Poe faced due to Allan's neglect (Campos, Besser, & Blatt, 2013; Kuruvilla & Jacob, 2007). Having a record of nonfatal suicide attempts is considered to be one of the most lethal of risk factors, however, especially if the attempt(s) occurred within the past 3 years (Bostwick, Pabbati, Geske, & McKean, 2016; Hawton & Fagg, 1988; Joiner, 2007). Consistent with these findings, there is substantial evidence suggesting that Poe attempted to overdose on laudanum in 1848, a meager year before his death (Meyers, 2000; Patterson, 1992; Pruette, 1920). Moreover, Poe's tendency towards suicidal thinking was apparent to others and caused them to fear for his safety (Shulman, 1997). In the wake of Poe's passing, French poet and contemporary Charles Baudelaire even speculated that the incident was “almost a suicide, a suicide prepared for a long time” (Mackowiak, 2007).

We felt that Poe's elevated risk for completing suicide, as well as the observer accounts of him experiencing psychological disturbances, warranted an unprecedented scientific exploration of suicide as cause for the author's death.

Depression, Suicide, and the Psychology of Language

The potential for depression and suicide to have played a role in the life and death of Edgar Allan Poe demands empirical analysis, but via what method? In the past century, considerable work has been published about Poe's psychology. Importantly, much of this work has stemmed from the field of Psychology itself (Young, 1951). Pruette (1920) reported a psychoanalysis of Poe's poems and other writings, suggesting that Poe was introverted and, having an anomalous sex life, was likely to have projected fixations of sexual sadism and death into his work; similar psychoanalyses persist to this day (Murtagh & Iurato, 2016). Other recent work on Poe's psychological profile tends to rely on observer reports, suggesting his personality to be impulsive, grandiose, and generally disagreeable (Giammarco, 2013).

However, several methodological developments afford a more objective, fine-grained analysis of an individual's psychology through the analysis of language. Hundreds of published studies have found consistent, reliable links between verbal behaviors (e.g., written works, e-mails, social media, and other text) and a person's underlying psychology (Chung & Pennebaker, 2007), reliably so across variety of writing genres (Litvinova, Litvinova, & Seredin, 2018).⁶ Written language has been shown to reflect an individual's "true" and present cognitive-emotional state and, through the automated analysis of language, it is possible to create a robust and accurate picture of a person's psychology through historical traces, not just in aggregate (Boyd & Pennebaker, 2015) but over time as well (Boyd, 2018).⁷

Text analysis software, such as LIWC (Pennebaker, Booth, Boyd, & Francis, 2015) have proven acutely successful at detecting underlying depressive affect in written forms of communication. Using LIWC2015, the most recent version of the LIWC software/dictionary, Mohammed and Johnstone (2017) discovered a correlation between increased absolutist word use (e.g. *entire, always*) and affective disorder severity. Eichstaedt et. al. (2018) showcased their ability to predict the depression status of hospital patients using only language data. Text gleaned from 6 months prior to patients' diagnoses afforded the researchers an impressive degree of predictive accuracy ($AUC = 0.72$), and revealed that increases in first-person singular pronouns were most strongly correlated with future depression status (a finding supported by Edwards & Holtzman, 2017; Stirman & Pennebaker, 2001). Words relating to negative emotions and cognitive processes have also been found to correlate substantially with future depression diagnoses (Eichstaedt et al., 2018).

Researchers have also succeeded at detecting linguistic patterns indicative of suicidality. For example, studies have found that suicidal persons make allusions to death more frequently (O'Dea, Larsen, Batterham, Calear, & Christensen, 2017; Van den Nest, Till, & Niederkrotenthaler, 2018). Individuals considering suicide also tend to employ first-person singular pronouns with inordinately high frequency (and first-person plural pronouns at an inverse rate) relative to non-suicidal controls, likely the effect of psychological disengagement (Stirman & Pennebaker, 2001; Van den Nest et al., 2018).

Case studies of persons who have completed suicide have proven especially helpful at illustrating the linguistic signatures that emerge when one is under profound psychological duress. Linguistic patterns detected in the writings of famed Australian explorer Henry Hellyer (1790-1832) and singer/actress Marilyn Monroe (1926-1962) appear to be in congruence with

those generally expected of persons contemplating suicide. That is, each of these persons' writings communicate statistically significant increases in first-person singular pronoun use and decreases in first-person plural pronoun use, relative to their individual baseline (Baddeley, Daniel, & Pennebaker, 2011; Fernández-Cabana, García-Caballero, Alves-Pérez, García-García, & Mateos, 2013). Hellyer's writings also depict an increase in negative emotion words, a trend indicative of worsening depression and oftentimes suicidality (Stirman & Pennebaker, 2001). Use of positive emotion words is generally expected to decrease and, while some research suggests heightened positivity preceding one's death by suicide (Lester, 2009; Rudd, 2008), most empirical works finds that positive affect in language ranges from unvaried to diminished in suicidal (versus non-suicidal) individuals, particularly males (Al-Mosaiwi & Johnstone, 2018; Egnoto & Griffin, 2016; Lightman, McCarthy, Dufty, & McNamara, 2007; Pająk & Trzebiński, 2014; Stirman & Pennebaker, 2001). In sum, it is the well-documented proficiency with which automated text analysis software detects depressive and suicidal affect and cognition in language that led us to adopt the method as our primary means of investigating the works of Edgar Allan Poe.

Current Study

The current study seeks to objectively analyze the corpora of author Edgar Allan Poe through automated language analysis and identify any notable trends in depressive affect. For suicide to be deemed a viable hypothesis for Poe's death, two conditions must be met. First, we should observe statistically significant elevations or respective declines (further described in the Methods section) in the LIWC2015 depression diagnostic measures in periods of intense psychological distress. In other words, we would expect provocative incidents like familial death

or climaxes in relationship tensions to visibly exacerbate Poe's depressive tendencies as well as his capacity for suicide (Joiner, 2007). Furthermore, these linguistic patterns of depression must appear consistent in the years preceding Poe's death, and do so with an intensifying presence. The case for suicide should be substantiated by evidence of severe depression and downward spiraling. Ultimately, our aim is to examine the psychological profile of the horror-genre author and consider if a scientifically-founded argument can be made for suicide as his cause of death.

Methods

Language Samples

All texts were collected from a historically complete corpus of Edgar Allan Poe works and letters provided online by *The Edgar Allan Poe Society of Baltimore* (EAPSB).⁸ Criteria for inclusion in the present study required that text samples have a minimum word count of 100 to avoid skewing (as per standard recommendation; Cohen et. al., 2009; Boyd, 2017), a decipherable month and year of creation, and be an academically verified writing of Edgar Allan Poe (i.e., the authorship is not, to our knowledge, under current scholarly dispute). In total, 111 letters, 48 poems, and 6 short stories (a total of 165, or approximately 28% of observations) were dropped from our sample and were not considered for analyses. The resulting sample size totaled 421 texts comprised of letters ($N = 309$), poems ($N = 49$), and short stories ($N = 63$) with an aggregated mean word count of 1026.45 ($SD = 1956.34$).

Language Analyses

Text samples were first analyzed using the LIWC2015 application and dictionary (Pennebaker, Booth, Boyd & Francis, 2015). The LIWC2015 application operates by scanning texts for words that reflect psychologically meaningful dimensions, such as self-focus, positive

and negative affect, social processes, and so on (Pennebaker, Boyd, Jordan, & Blackburn, 2015). Results from these analyses come in the form of percentages of dictionary words per category. For example, if 1 out of every 10 words within a text is classified as a “cognitive process” word, LIWC2015 scores the text at 10% for this category. While this word-counting approach is relatively simplistic, it is incredibly robust to context; indeed, the LIWC2015 approach is the most widely-used framework for the psychological analysis of language and has been well-validated across hundreds of studies spanning various domains (Tausczik & Pennebaker, 2010).

For the current study, we focused on the 5 distinct LIWC2015 measures that have consistently been established as diagnostic of depression and/or suicidality (as described earlier): first-person singular pronouns (e.g., words like *I*, *me*, and *my*), negative emotion words (*bad*, *sad*, *angry*), cognitive processing words (*think*, *understand*, *know*), positive emotion words (*happy*, *good*, *terrific*), and first-person plural pronouns (*we*, *us*, *our*). Descriptive statistics for each measure, by corpus genre, are presented in Table 1. In order to create a unified, composite measure of depressive cognition/affect, all categories were first standardized into z-scores, then averaged across genre, by year; the standardization of LIWC2015 categories prior to aggregation has been found to be successful in past work using LIWC2015 composites (Markowitz & Hancock, 2016; Quercia, 2015) and eliminates base rate differences that naturally occur as a function of genre (Pennebaker, 2011; Pennebaker, Boyd, et al., 2015).

The result of this procedure was a single composite measure of depression in Poe’s language, per year.⁹ Following standardization and aggregation, then, it is possible to identify points of particularly high depressive language by identifying years in which Poe’s patterns deviated from his baseline scores at 95th percentile thresholds (i.e., $p < .05$), corresponding to z-scores in excess of +1.96 (two-tailed test; $z \geq +1.65$ for a one-tailed test). Put another way, by

observing Poe's linguistic scores for depression for each year of his life, we can identify with some degree of confidence those points during which he may have suffered from particularly pronounced bouts of affective disruption (e.g., Larsen et al., 2015). Additionally, by plotting depression scores as a time series, we can qualitatively inspect Poe's psychological state across time, thus better understanding any trends that emerge and help to determine whether any such patterns were pervasive or pronounced enough to suggest a state of suicidality.

Results

To preface our main analyses, we conducted a series of one-sample t-tests to assess the degree to which Poe's language use approximates patterns indicative of depressive affect using the norms reported in the LIWC2015 psychometrics manual (Pennebaker, Boyd, et al., 2015). Results of these tests (Table 2) were mixed. Poe's affect appears to be *more* positive than average, as indicated by his exceedingly high use of positive emotion words and notably low use of negative emotion words. However, the author's elevated use of first-person singular pronouns and decreased use of first-person plural pronouns suggest that Poe's language bears undeniable semblance to that of persons in poor psychosocial health. With this in mind, we advanced in our analyses of the variation in Poe's depressive language as it manifested over time.

Analyses of composite depression scores produced no discernible patterns of depressive affect leading up to Poe's death. In other words, no significant patterns indicative of suicide emerged across the three genres. Statistically significant deviations from Poe's baseline affect were entirely absent from most of the assessed samples ($n = 403$), however, one deviation was recorded from among Poe's poems, 2 from his short stories, and 15 from his letters. Illustrations

of trends in individual LIWC2015 categories (cross-genre) are presented in Appendix A.¹⁰

Graphs depicting Poe's overall depression trends (by genre) are depicted with outlier details in Figures 1 through 3. When observed holistically (i.e., cross-genre), outlying works appear to be most frequently assigned to the years 1843, 1845, and 1849, with 9 out of 18 total outliers concentrated among them.

Discussion

The lack of pervasiveness of depressive markers in the years preceding Edgar Allan Poe's death contraindicates the suicide hypothesis (see Table 2). However, our findings give credence to Poe's recorded tendency toward affective instability and may imply the presence of an underlying psychiatric disorder. Results also indicate that Poe exhibited modest increases in depressive affect at various points near the end of his life – points that co-occur with several of the author's significant life events. These events likely acted as stressors during Poe's later years and jointly contributed to the decline of his mental health.

Poe's Depression and Major Life Events

Poe's work began to grow wildly in popularity in 1843. That January saw the publication of "*The Tell-Tale Heart*," a grotesque, yet riveting, short story that would become one of Poe's most recognized works. The tale, initially receiving mixed reactions from the public, would go on to be reprinted several times during Poe's life because of its popularity.¹¹ Even more life-altering was the immense praise Poe received following the publication of "*The Gold-Bug*" later that year. The story won a \$100 best prize award and was published in the *Dollar Newspaper*. It was deemed an instant success and was reprinted repeatedly to meet public demand (Quinn,

1941). This success bolstered Poe's rise to literary prominence, further supported by the positive reception of "*The Black Cat*," the following August. However, it was not until his publication of "*The Raven*" in 1845 that the author's career truly peaked. The poem, loved by laypersons and critics alike, elevated the author to national celebrity status. The masterpiece would cement Poe not only as the father of the macabre genre but as a timeless icon of American literature.

Notably, both our empirical findings and Poe's own words support the notion that his success was a considerable stressor. Poe himself revealed his complicated relationship with fame in his conversations with fellow writer Mary Grove Nichols in 1846 and 1847. In their initial conversation on the matter, Poe disdainfully proclaimed that fame was not a personal motive, stating, "What can I care for the judgment of a multitude, every individual of which I despise?" Poe later claimed a polar opposite opinion, expressing that he deeply idolized fame and would "drink to the very dregs the glorious intoxication" (cf. Carlson, 1996). Poe's volatile regard for fame may imply a deeply-seated tension caused by his surge in popularity. Though his profession granted him a natural predilection towards fame, it appears that the *fulfillment* of his aspirations proved detrimental to his psyche, and the lack of tangible results of Poe's newfound social and literary prominence likely betrayed his expectations. The groundbreaking author never reaped serious financial benefit from his successes and continued to suffer in poverty until his death. Fame, accompanied by significant impoverishment, proved to be a harrowing disappointment in Poe's life.

One can easily identify Virginia Poe's declining health (and eventual death) as another source of Edgar Allan Poe's distress. In his 1848 letter to George Washington Eveleth, Poe describes the agony that his late wife's condition had caused him. In early 1842, when Virginia first presented with the symptoms of tuberculosis, Poe witnessed her burst a blood vessel while

singing (Silverman, 1991). The gruesome sight of Virginia coughing up blood deeply traumatized the author and was the first of several such episodes Poe would witness until his wife's death in 1847. Though undoubtedly traumatic, it seems that the unstable nature of Virginia's illness plagued him more than her actual death. In the same letter, Poe wrote that Virginia would be nearing death one day, and then would recover partially on another. The turbulent swinging between anxiously awaiting his beloved wife's death and eagerly hoping for her recovery fraught the author. Each time her condition altered, Poe experienced "all the agonies of her death" and "clung to her life with more desperate pertinacity." Poe was launched into a state of psychological dishevelment that appears to have persisted until his death.

When considering our findings, it is curious to note the fact that though they are present in the years leading up to her death, no outliers were identified in the year Virginia passed (i.e. 1847). Given the agony Poe endured throughout Virginia's illness, it is reasonable to suggest that her death may have had a psychologically alleviating effect on the author. Though he grieved her loss, Poe was no longer victimized by the psychological rollercoaster that was Virginia's illness. In other words, it seems possible that he was able to find a temporary, emotional reprieve in the finality of his wife's death.

Poe and Psychiatric Illness

Though we should not attempt to assign Poe a definitive clinical diagnosis posthumously, we can utilize the available historical and linguistic evidence in our understanding of his mental health. Considering observational evidence of his lifelong struggle with depression as well as our own findings, it appears that a classification of dysthymia (i.e. persistent depressive disorder) or even major depressive disorder is perhaps the most fitting for Poe. Some researchers have

speculated that the author experienced mania *in addition* to his depressive affect and posit that his symptomatology is better represented as a bipolar or cyclothymic disorder (Jamison, 1993; Teive et al., 2014). Gómez (2012) conducted a lexical assessment of Poe's corpus of short stories, characterizing their patterns of linguistic fluctuations to be consistent with mania and depression. Given that the years we found Poe to be most depressed (i.e. 1843, 1845, 1849) coincide with one of Gómez's periods of disturbed affect, it is entirely possible that the depressive episodes we have identified represent the "lows" of bipolar disorder.

Poe's relatively chronic and unhealthy use of alcohol is also of clinical import. Though his drinking behaviors reportedly began at age 17 (Giammarco, 2013), Poe himself described his most severe period of alcohol consumption as occurring between the years 1842 and 1847 (notably, the years in which Poe's fame peaked and Virginia's illness cycled rapidly until her death). In 1848, Poe wrote, "I became insane, with long intervals of horrible sanity. During these fits of absolute unconsciousness I drank, God only knows how often or how much" (letter from Poe to George Washington Eveleth, January 4th, 1848). This period of heightened alcohol consumption is largely in chronological alignment with our findings of increased depression (i.e. 1843, 1845), the only exception being 1849, the year in which Poe made a public pledge of temperance (Thomas & Jackson, 1987). This observation fits in well with the literature, which firmly establishes that mood disorders (e.g. major depression, bipolar depression) and substance use disorders are highly comorbid, with one's maladaptive coping behaviors typically exacerbating the symptoms of their mental illness (Quello, Brady, & Sonne, 2005). Both Poe's biological father (David Poe) and brother (Henry Poe) were considered alcoholics, indicating that he may have been genetically predisposed to addiction (Kennedy, 2001; Poe, 1966). His frequent use of alcohol in early life and beyond may suggest that his drinking actually gave rise

to his depressive episodes, as is the case in a substance-induced mood disorder (Quello et al., 2005). Though the exact nature of the relationship between Poe's affective instability and alcohol use is difficult to disentangle, his alcohol dependence was nonetheless a prominent issue in his life, and regularly proved detrimental to the author's relationships, reputation,¹² and professional endeavors (Giammarco, 2013).

Limitations

It is important to note that our analyses of Poe's language are historical in nature – any interpretation of our findings should be deemed tentative. Our samples from Poe's corpora were derived from the earliest available manuscript of each document, meaning that they may not offer as accurate a psychological picture as an original manuscript. Furthermore, the genre of one's writings may have an impact on their language. For example, personal letters may elucidate different psychological patterns than say, professional writings, and it is currently unclear how each type of writing may differentially reflect a person's underlying psychology. Additionally, our data, while as comprehensive as possible, is not able to account for behavioral “whitespace” – extended and potentially psychologically important periods during which Poe may have refrained from writing (Coppersmith, Hilland, Frieder, & Leary, 2017). Lastly, one must exercise healthy skepticism when reviewing works containing third party, anecdotal accounts of a historical figure's life as they may be colored by social bias. In short, our findings are intended to offer clarity to the mystery that is the psychology and death of Edgar Allan Poe, but do not claim conclusiveness in either thread.

Conclusion

Though Edgar Allan Poe's cause of death remains a mystery, our study has served to enrich his psychological profile that is suggested by the literature via automated text analysis. Our study illustrates LIWC2015's ability to identify underlying depressive affect in an individual's writings and suggests the software be used in clinical settings as an additional means of psychological evaluation, and well as an aid in suicide prevention. As we and other researchers have shown, language analysis methods also prove valuable when employed in retrospective analyses of suspected suicide cases. These tools can be used in unraveling historically enigmatic deaths (Baddeley et al., 2011; Fernández-Cabana et al., 2013) and aid in the study of emotional reactivity through language use. Furthermore, language analyses can enable the progression of scientific understanding of the subsurface, behavioral effects of acute psychological distress and, subsequently, allow for improved methods of identifying suicidal affect and deterring future suicide attempts.

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Tables

Table 1. Descriptive statistics for LIWC2015 measures that have been found to be diagnostic of depression in previous work, as measured in the writings of Edgar Allan Poe. Date ranges displayed are inclusive of all collected data from each corpus genre (i.e. letters, poems, and short stories).

Language Measure (LIWC2015 variable name)	Direction Diagnostic of Depression	Letters <i>M</i> (SD)	Poems <i>M</i> (SD)	Stories <i>M</i> (SD)
		Years Corpus Genre Spans: 1824-1849	Years Corpus Genre Span: 1827-1849	Years Corpus Genre Spans: 1831-1849
First-person singular pronouns (I)	+	6.58 (2.72)	3.45 (3.25)	3.35 (2.02)
Negative emotions (negemo)	+	1.49 (1.12)	2.17 (1.40)	1.96 (0.66)
Cognitive processes (cogproc)	+	11.58 (2.70)	7.72 (2.71)	9.85 (2.25)
First-person plural pronouns (we)	-	0.55 (1.13)	0.55 (0.95)	0.70 (0.65)
Positive emotions (posemo)	-	4.08 (1.65)	4.53 (2.46)	2.60 (2.25)

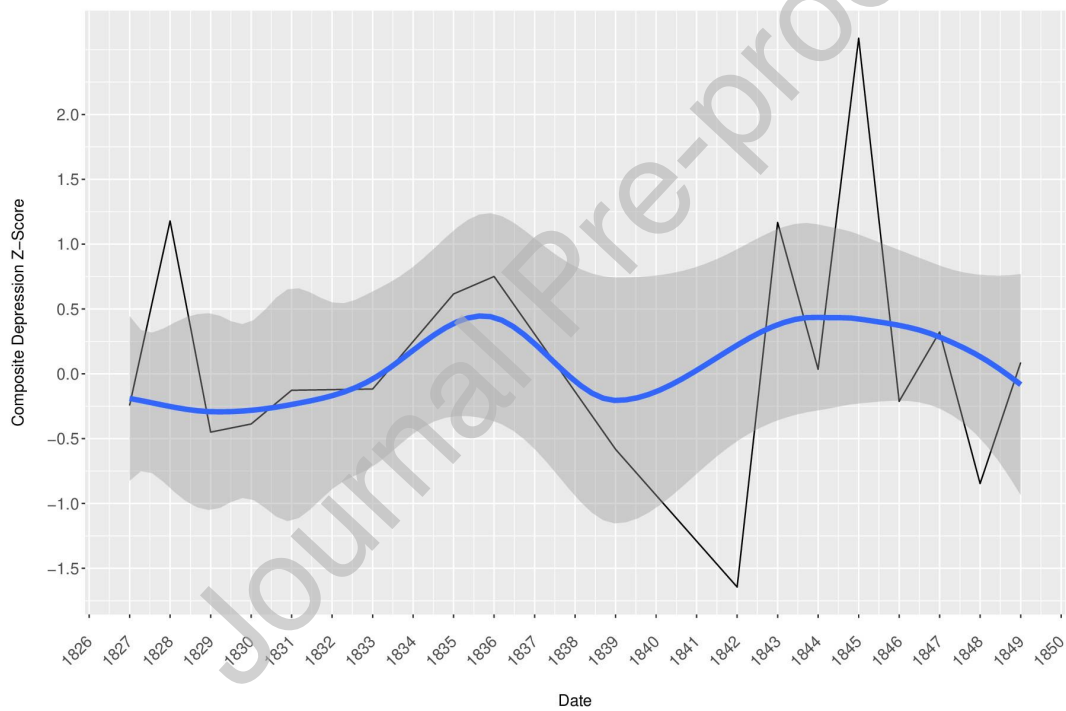
Table 2. LIWC2015 normative means and Edgar Allan Poe's cross-genre means for utilized diagnostic measures of depression. Both expressive writing and novel normative means (denoted by ^N and ^E, respectively) are included in consideration of the eclectic nature of Poe's work. Results appear to be mixed, though Poe's markedly high use of first-person singular pronouns and distinctively low use of first-person plural pronouns (relative to expressive writing and novel norms) heavily imply the presence of depression.

LIWC2015 Diagnostic Category	Grand <i>M</i> Poe (Grand SD)	<i>M</i> Normative Writing (SD)	One-Sample t-Test (Two-tailed)
I	4.46 (2.66)	2.63 ^N , 8.66 ^E (4.25)	14.12 ^{N*} , -32.40 ^{E*}
Negemo	1.87 (1.06)	2.08 ^N , 2.12 ^E (1.63)	-4.06 ^{N*} , -4.84 ^{E*}
Cogproc	9.72 (2.55)	9.84 ^N , 12.52 ^E (5.11)	-0.97 ^N , -22.53 ^{E*}
We	0.60 (0.91)	0.61 ^N , 0.81 ^E (1.22)	-0.23 ^N , -4.73 ^{E*}
Posemo	3.74 (2.12)	2.67 ^N , 2.57 ^E (1.74)	10.36 ^{N*} , 11.32 ^{E*}

Notes: * = Statistically significant difference from population mean, $p < .0001$

Figures

Figure 1. Poem genre trends in depressive affect across time as generated from text analysis. The blue line represents a rolling average to improve pattern visibility. The graph illustrates a considerable increase in depressive affect in the year 1845, evidenced in the poem “To - [Violet Vane].”



DEEP INTO THAT DARKNESS PEERING

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Figure 2. Short story genre trends in depressive affect across time as generated from text analysis. Depressive affect is shown to increase in the years 1839 and 1845, as reflected in his works *“The Conversation of Eiros and Charmion”* and *“The Imp of the Perverse,”* respectively.

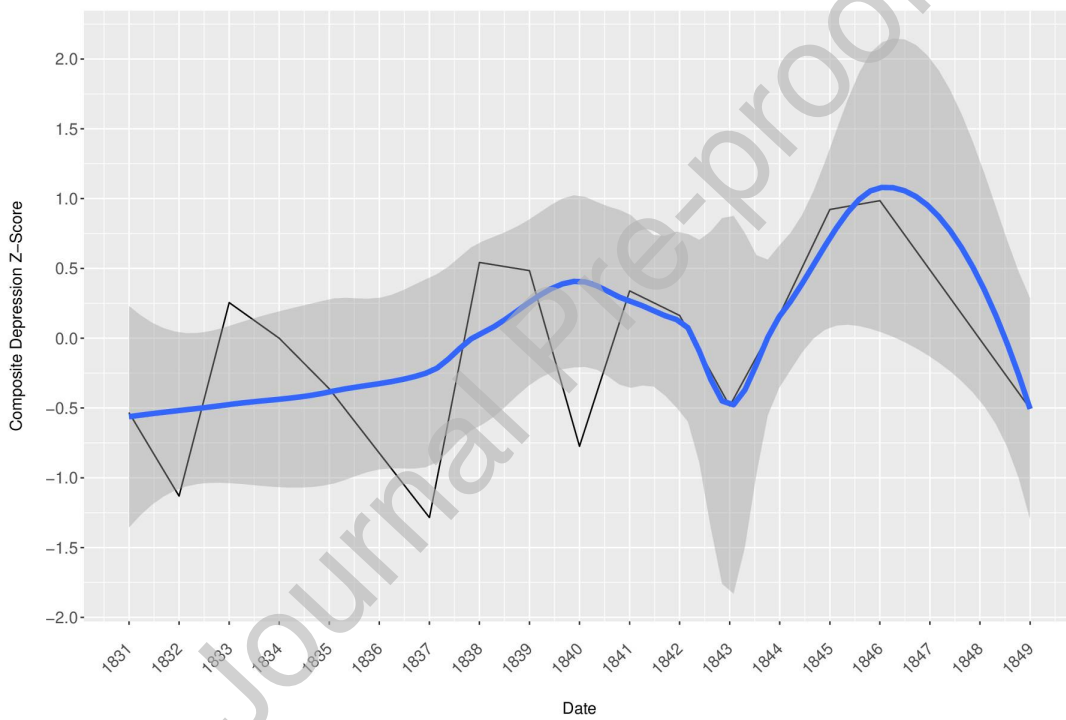
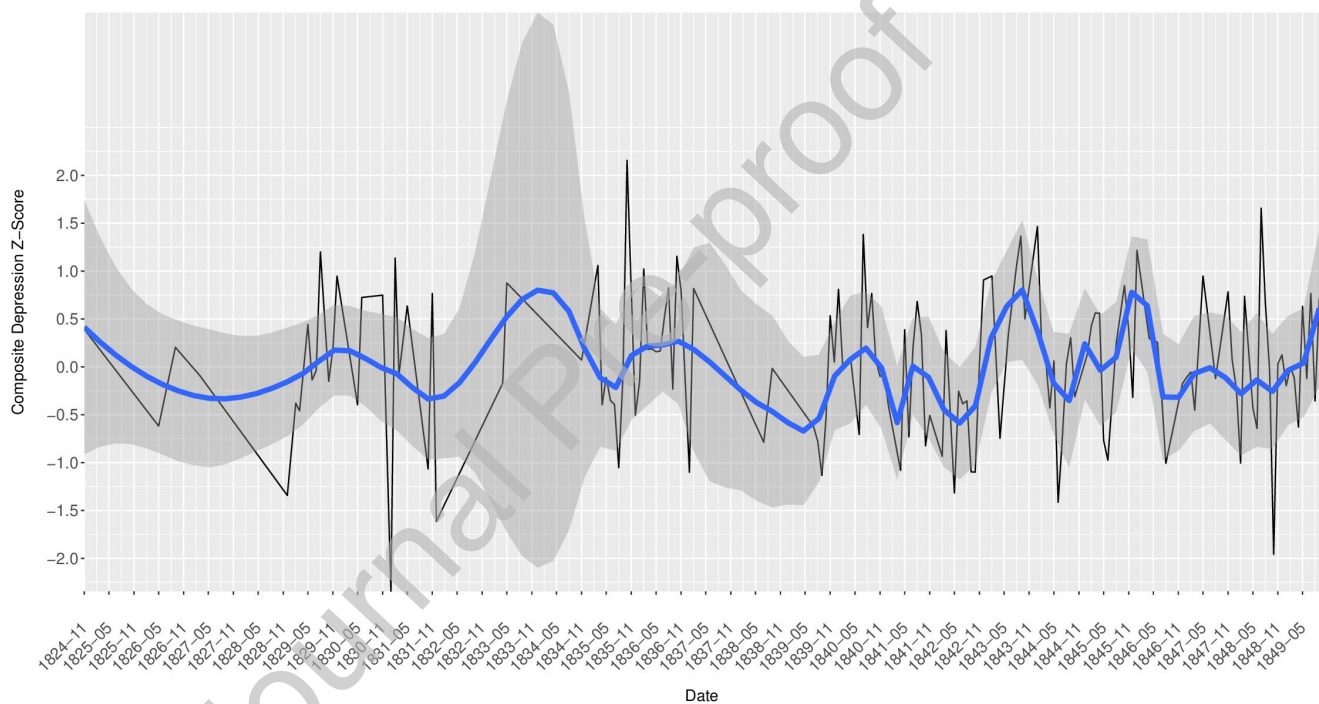
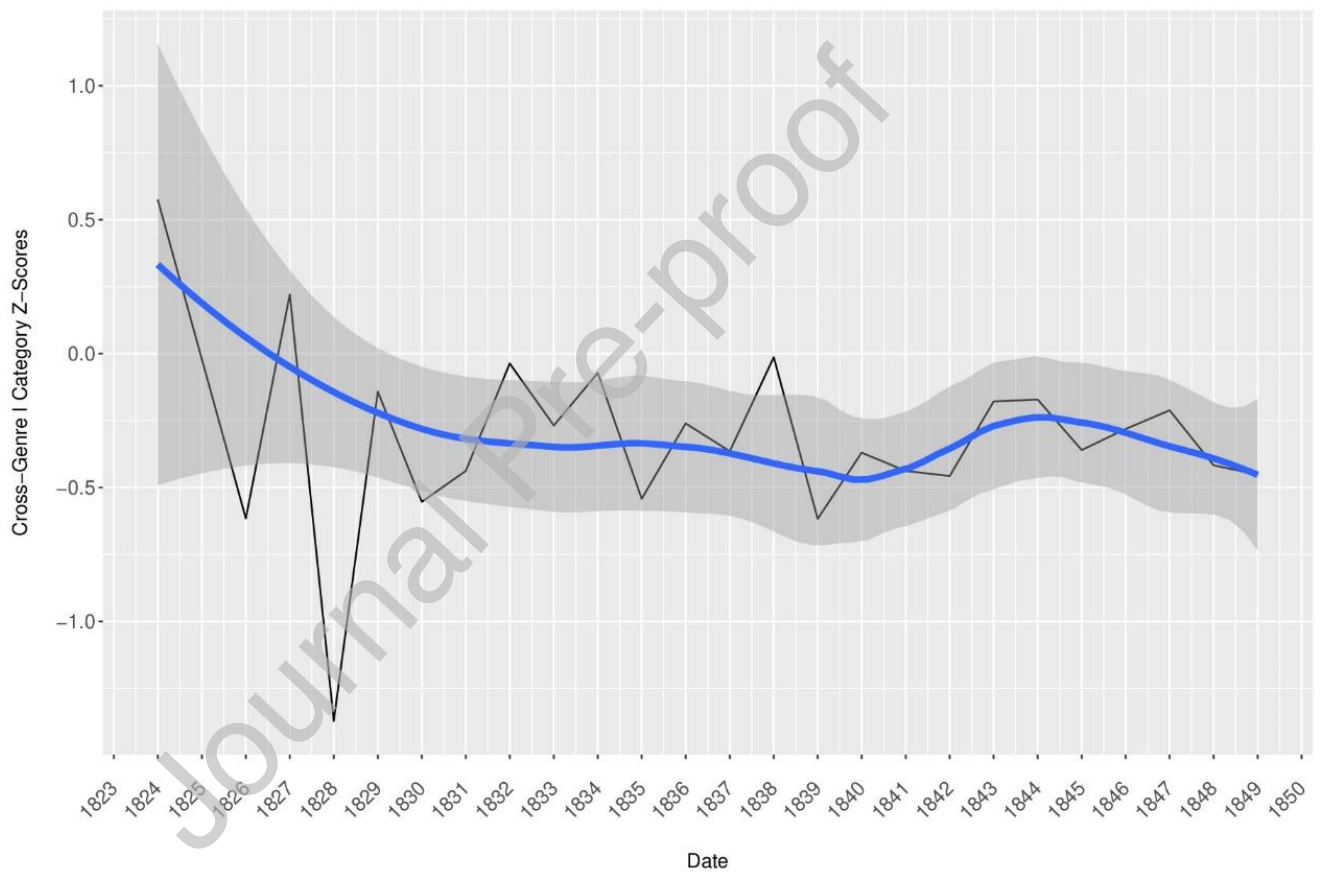


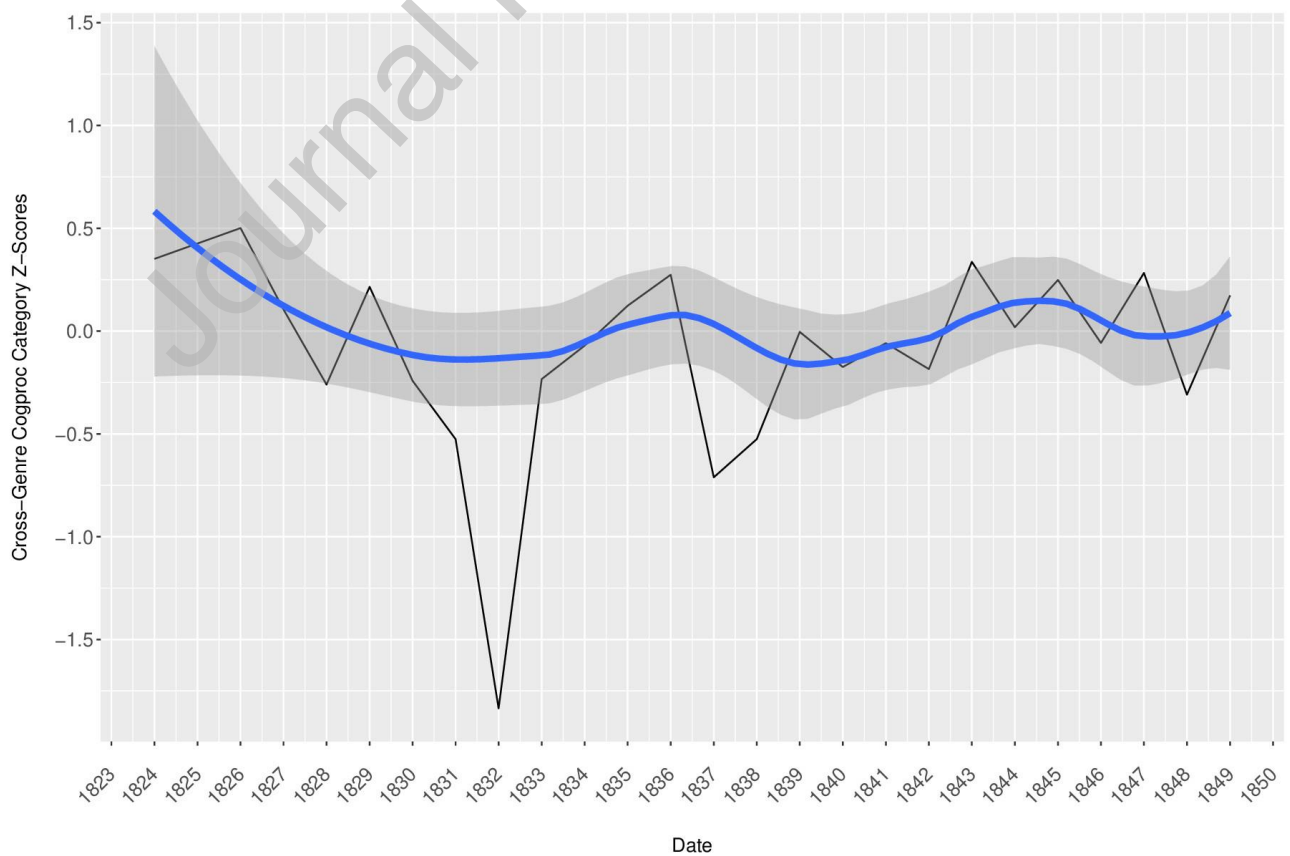
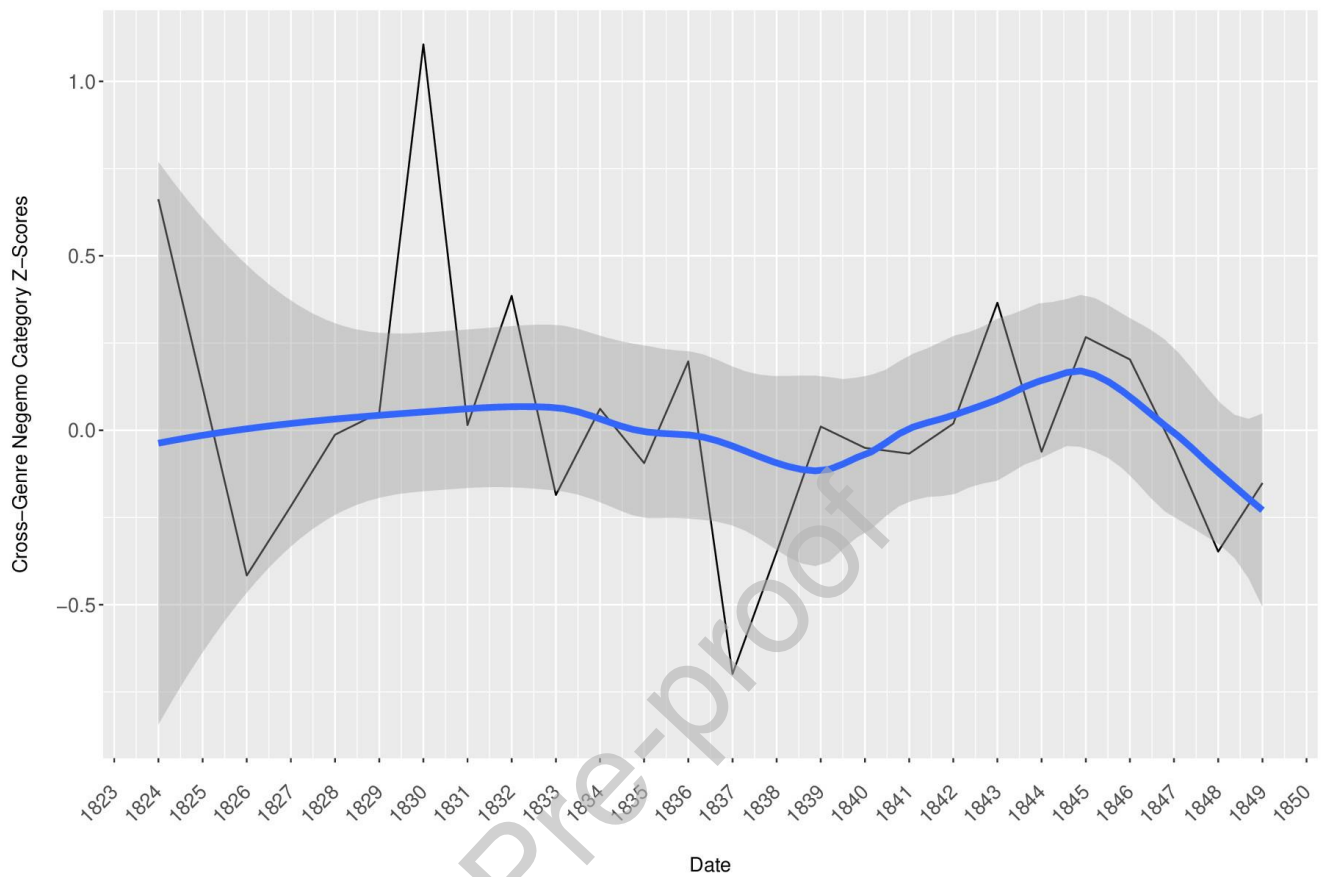
Figure 3. Letter genre trends in depressive affect across time as generated from text analysis. Increases in depressive affect are delineated in the years 1829, 1835, 1838, 1840, 1843-1846, and 1849. See Appendix B for specified letter dates and recipients.

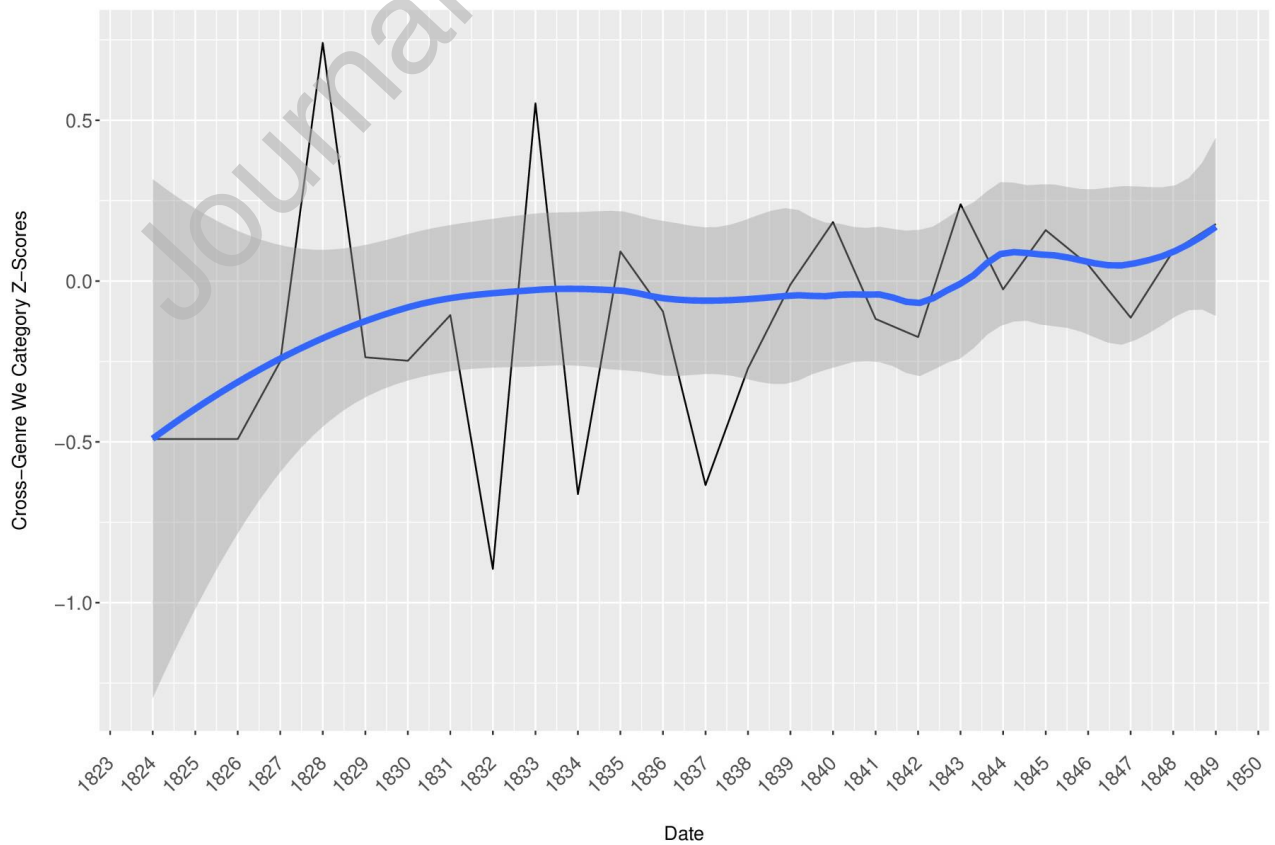
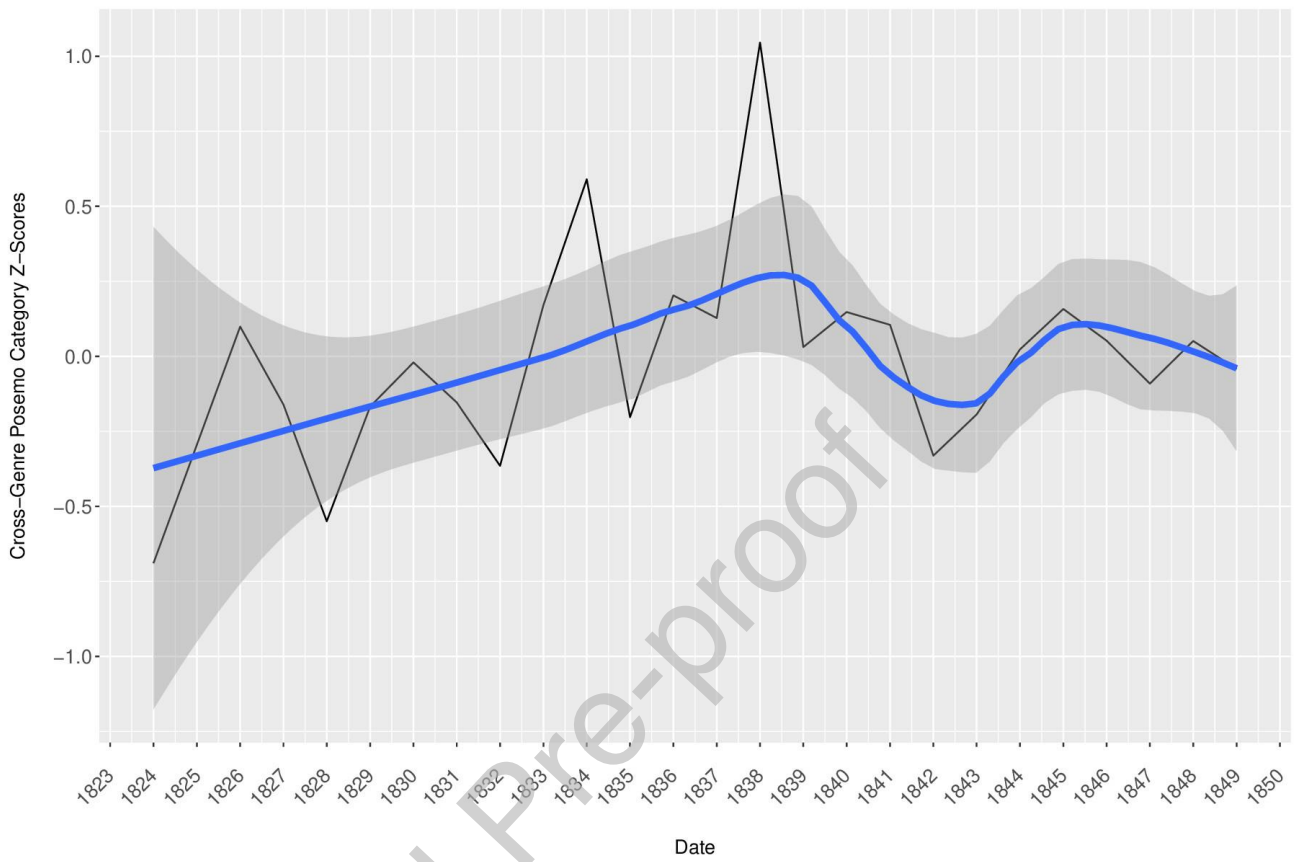


Appendix A

Cross-genre trends in Poe's use of first-person singular pronouns (I), negative emotion words (negemo), cognitive processing words (cogproc), positive emotion words (posemo), and first-person plural pronouns (we), respectively, are presented here.







Appendix B

Chronological information and documented recipients of Poe's personal letters that represent statistically significant deviations from baseline affect (i.e. increases in depression).

Recorded Date	Recipient
August 10, 1829	John Allan
October 8, 1835	Robert Montgomery Bird
September 11, 1838	John C. Cox
August 14, 1840	William Poe
February 16, 1843	Robert Carter
August 26, 1843	Dr. Ezra Holden
October 10, 1843	John Boucher Morris
May 31, 1844	Edward L. Carey
October 26, 1845	Rufus Wilmot Griswold
January 8, 1846	Evert Augustus Duyckinck
April 16, 1846	George Washington Eveleth
July 14, 1848	Dr. Thomas Holley Chivers
February 5, 1849	Frederick Gleason
July 14, 1849	Mrs. Maria Clemm (formerly Maria Poe)
September 18, 1849	Mrs. Sarah Anna Lewis (a.k.a. Mrs. Stella Anna Lewis, and Mrs. Estelle Anna Lewis)

Footnotes

- ¹ See Supplementary Materials 1 for additional biographical details of Poe's life.
- ² Poe pays tribute to his adoptive mother in his solemn and melancholic poem, "*Fanny*" (1833).
- ³ See "*Annabel Lee*," and "*Lenore*," for illustrations of Poe's gloomy conceptualization of femininity.
- ⁴ See "*The Masque of the Red Death*," and "*The Pit and the Pendulum*," for examples of these intensely macabre works.
- ⁵ See Supplementary Materials 1.2 for a more detailed description of the financial conflict between Poe and John Allan and its implications.
- ⁶ See Supplementary Materials 2.1 for notes on the assessment of written language across work genre.
- ⁷ See Supplementary Materials 2.2 for further explanation of the psychological implications of the writing process.
- ⁸ <https://www.eapoe.org/works/index.htm>
- ⁹ See Supplementary Materials 3 for a brief description of data standardization (i.e., z-scoring) and its use in the present study.
- ¹⁰ A complete array of plots for each category, by genre, is presented in Supplementary Materials 4.
- ¹¹ See <https://www.eapoe.org/works/info/pt043.htm> for a list of republications.
- ¹² It should be noted that Poe cemented his reputation as a drunkard after a disastrous public incident on October 16, 1845 (see: <https://www.eapoe.org/geninfo/poealchl.htm>). That said, anecdotal claims of Poe's drunkenness after this date should be taken with caution, as they may consist of ill-intended rumors or highly unsubstantiated claims.