

Emotions During Writing about Socially-Charged Issues: Effects of the (Mis)Alignment of Personal Positions with Instructed Positions

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Abstract

Although considerable research has investigated the role of emotions in learning and problem solving, there is a paucity of research on the emotional and social aspects of academic writing. As an initial step in this direction, we conducted a study where 42 participants wrote two essays on two opposing stances about abortion (pro-choice and pro-life). Participants' affective states (14 emotions plus neutral) were tracked at 15-second intervals via a retrospective affect judgment protocol. The results indicated that engagement, anxiety, confusion, frustration, and curiosity were the more frequent states, while the 'basic' emotions (e.g., sadness, disgust) were comparatively infrequent. Participants experienced more boredom when writing essays that did not align with their positions on abortion, but were more engaged when there was alignment. Participants also reported more curiosity while writing pro-choice essays. Importantly, boredom, engagement, and curiosity were the affective states that predicted essay quality. Lastly, self-reported interest before writing differed based on the alignment of positions and was related to affect in expected directions. We discuss the implications of our findings for ITSs that support the development of writing proficiency.

Introduction

The value of skilled writing is recognized early in the education system and becomes increasingly important throughout school and into professional careers. School grades can begin to suffer for weak writers, especially in classes where evaluations are primarily based on writing quality (Graham 2006b). Moreover, it has become routine to have timed writing sections on many of the popular standardized tests that are required for admittance to undergraduate programs (i.e., the Scholastic Aptitude Test) and graduate programs (i.e., the Graduate Record Exam) in

the U.S. Hence, the importance of developing writing proficiency cannot be underestimated.

Unfortunately, the typical US student is not a very proficient writer (NAEP 2007). This fact has prompted ITS researchers to develop educational technologies for the purpose of improving writing proficiency. For example, Summary Street (Wade-Stein and Kintsch 2004) helps students with written summaries by providing guidelines, exemplars, practice exercises, and formative feedback. Writing Pal (W-PAL) (McNamara et al. 2012) is a more recent example of an ITS that teaches writing proficiency. W-PAL helps students improve writing quality by teaching students new writing strategies and scaffolding the learning of these strategies through a series of training and practice lessons.

Summary Street and W-PAL are examples of two ITSs that have made significant contributions towards technologically-supported training in writing strategies. However, the focus of these systems is on the cognitive (Summary Street and W-PAL) and motivational (W-PAL) aspects of writing, at the expense of the emotional aspects of the writing process. There has also been considerable research aimed at understanding the role of emotions in learning (Arroyo et al. 2009; Baker et al. 2010; D'Mello, Graesser, and Picard 2007; Litman and Forbes-Riley 2006; Meyer and Tuner 2006; Pekrun 2010), but the emotions that accompany writing have rarely been investigated.

There are two exceptions to the general lack of research in the area of emotions and writing. More than two decades ago, Brand and Powell (1986) asked apprentice writers to report on their affect before and after a writing session. They found that positive emotions (e.g., satisfied, relieved) significantly increased during writing from pre to post ratings. Negative passive emotions, such as boredom and confusion, decreased over the writing session, while negative active emotions, like fear and anxiety, did not exhibit much change. Somewhat similar findings were

reported when Brand and Leckie (1988) asked professional writers to report on their affect three different times (i.e., before, a pause during, and after the writing session).

More recently, D'Mello and Mills (in review) investigated the emotions that students experienced during short writing sessions on three different topics (e.g., academic, socially-charged, and personal emotional experiences). Academic topics were adapted from the ACT (e.g., "the use of class discussion") and socially charged topics focused on issues like "abortion" or "the death penalty." Personal emotional experience topics involved writing about recent experience with emotions such as anger, happiness, and fear. The findings supported the hypothesis that writing is an emotionally charged activity, as the fourteen affective states accounted for 78.9% of the observations compared to neutral (21.1%). The most frequent affective states were engagement/flow, boredom, anxiety, confusion, frustration, and happiness.

With the exception of these two examples, neither the writing research community nor the ITS community has sufficiently investigated the emotion-cognition link in the context of academic writing other than work on the positive effects of expressive writing on well-being (Pennebaker 1997). The present paper addresses this issue by analyzing the emotions that naturally arise during writing about socially-charged issues. We focused on socially-charged issues because previous research indicated that writers were less likely to experience boredom when composing essays on these topics compared to the more traditional academic writing prompts (D'Mello and Mills in review). However, there might be a liability in assigning these social topics because they are usually controversial and people may have strong opinions on opposing sides of these issues. To further investigate this issue, the present focus was on uncovering how emotions are influenced by writers' positions on socially-charged issues. More specifically, how does the alignment or misalignment between personal beliefs and instructed essay position impact writers' emotions? For example, will an alcoholic, a social drinker, and a teetotaler (behavior regarding alcohol consumption) have the same emotional experiences when asked to write about reinstating the 1920 ban on alcohol (instructed position)?

Although there is little data to address this question, the control-value theory of academic emotions (Pekrun et al. 2007) provides some testable hypotheses on how emotions are affected by the (mis)alignment of actual positions and instructed positions. This theory posits that appraisals of control and value of a learning activity are important antecedents of the emotions that arise during learning. Subjective control pertains to the perceived influence that a person has over the activity, while subjective value represents the perceived value of the outcomes of the activity. According to this theory, alignment of personal

position with instructed position might trigger appraisals of increased value, which would increase motivation to write, and positively impact engagement. On the other hand, misalignment of personal position and instructed position might lead to lower appraisals of value, less motivation, and increased boredom.

This question was tested in a study where 42 participants were asked to write essays while adopting a pro-choice and a pro-life stance on abortion¹. We selected the topic of abortion because it is controversial, individuals have strong beliefs, and individuals in the U.S. are approximately evenly divided in the stance they adopt. We focused on answering four research questions: (1) What affective states do writers experience when writing about abortion? (2) How are affective states influenced by personal position, instructed position, and the interaction between (mis)alignment of these two factors, (3) Are affective states predictive of writing quality? and (4) How do perceptions of writing relate to the alignment of positions and affective states during writing?

Methods

Participants and Design

The participants were 42 undergraduates from an urban U.S. university who participated for course credit. The study had a within-subjects design in which the participants were required to write in support of both pro-choice and pro-life perspectives on abortion. The ordering of the essay topic was counterbalanced across participants. None of the participants refused to write about either position on abortion. Participants were asked to rate their own stance on abortion after writing both essays and 40.5% of participants self-identified as being pro-life while 59.5% self-identified as being pro-choice.

Procedure

Participants were instructed to present a coherent argument for the pro-choice/pro-life position, regardless of what their *actual* position on abortion may be. Participants were given 15 minutes to complete the first essay. They were then given an additional 15 minutes to write a second essay that adopted a position opposite to the first essay (e.g., pro-choice first and pro-life second or pro-life first and pro-choice second). Participants typed their essays on a computer interface and the content of the essays was stored in text files for offline analysis. Videos of participants' faces and computer screens were also recorded.

¹ A short (500 word) version of this paper that featured some preliminary analyses was presented as a poster at another conference (see Mills & D'Mello, 2012). This full paper is a significant expansion of the poster in terms of theoretical, explanatory, and analytical depth.

Participants provided self-judgments of their affective states immediately after the writing session via a retrospective affect judgment procedure (D'Mello and Graesser 2011; Graesser et al. 2006; Rosenberg and Ekman 1994). Participants viewed a video of their face along with the screen capture video of their writing session on a widescreen monitor. The screen capture included the writing prompt and dynamically presented the text as it was written, thereby providing the context of the writing session.

Participants were instructed to make judgments on what affective states were present at any moment during the writing session by manually pausing the videos (spontaneous judgments). They were also instructed to make judgments at each 15-second interval where the videos automatically stopped (fixed judgments). Participants made their ratings via a computer interface that allowed them to select one out of 14 affective states (anger, anxiety, boredom, confusion, contempt, curiosity, delight, disgust, happiness, engaged, fear, frustration, sadness, surprise) plus neutral. This method allows for the emotion judgments to be made on the basis of a combination of participants' facial expressions, contextual cues via the screen capture, the definitions of the states (presented on a sheet), and their memories of the recently completed writing session.

Participants also completed a questionnaire before and after writing each essay to measure their prospective and retrospective attitudes of writing on the given topic. All questions were answered on a scale of 1 to 6. The four pre-writing questions assessed participants' confidence, level of comfort, and interest in writing about the given topic, as well as how much effort they would put into writing about that topic (e.g., How much effort would you put into writing an essay that opposes abortion?). The five post-writing questions assessed participants' perception of the essay quality, if they would have liked more time to write, as well as their levels of emotional involvement, general engagement, and effort during writing.

Scoring Essays

The essays were scored based on a modified version of a standardized rubric used to grade essays from the SAT (McNamara, Crossley, and McCarthy 2010). Essay quality was scored on a 6-point scale with a score of 1 indicating little or no mastery with several major flaws, 3 indicating developing mastery with one or more major flaws, and 6 indicating clear and consistent mastery with minor errors. The essays were randomized and scored by a trained judge. The judge was blind to participant identity and actual positions on abortion. Reliability ($r = .906$) was obtained in a previous study with similar essays.

Results and Discussion

Proportion of Affective States During Writing

The retrospective affect judgment protocol yielded a total of 5,462 emotion observations across the 42 participants. Table 1 presents descriptive statistics on the proportional occurrence of affective states averaged across both essays. 75.0% of the observations involved at least one affective state while the remaining 25.0% of observations were neutral. This finding is consistent with previous research indicating that affective states are quite prominent during writing activities (Brand and Powell 1986; Brand and Leckie 1988, D'Mello and Mills in review).

Only six out of the fourteen affective states (excluding neutral) occurred with some regularity. Engagement/flow was the most frequently reported, accounting for 31.7% of the observations. Boredom and confusion occurred at similar rates and were the two next most frequent states. Three other affective states (anxious, curiosity, and frustration) occurred at least three percent of the time. Similar to a previous study that included considerably more topic choices, it was the learning-centered states, not the basic emotions, that were more prominent (D'Mello and Mills in review). The seven basic emotions accounted for only 9.4% of the observations, while the learning-centered states comprised 65.6% of the affect reports.

Table 1. Mean proportional occurrence of affective states across learners

Basic Emotions	<i>M</i>	Learning-Centered	<i>M</i>
Anger	.012	Anxious	.031
Contempt	.027	Boredom	.099
Disgust	.011	Confusion	.097
Fear	.002	Curiosity	.034
Happiness	.022	Delight	.018
Sadness	.016	Engaged/Flow	.317
Surprise	.004	Frustration	.060
Neutral	.250		

Effect of Instructed Position and Actual Position

The question of whether instructed essay positions and actual positions on abortion influenced the affective states was investigated by constructing separate mixed effects binary logistic regression models for the six most frequent states (anxious, boredom, confusion, curiosity, engagement/flow, and frustration). Mixed effects logistic regression modeling is the recommended analysis for the present data because (a) the dependent variable was binary, (b) there were multiple observations for each participant,

and (c) the effects of extraneous random factors such as participant and essay order need to be accounted for (Pinheiro and Bates 2000).

The data was analyzed at the item level with the dependent variable being an indicator variable denoting the presence (1) or absence (0) of each affective state. The random effects were participant (categorical with 42 levels) and order of instructed position (i.e., pro-choice first vs. pro-life first). The fixed effects were *instructed position*, *actual position*, and the *instructed* \times *actual* interaction.

Significant models ($p < .05$ unless specified otherwise) were discovered for curiosity, boredom, and engagement/flow, but not for anxious, confusion, and frustration. For curiosity, the main effect of *instructed position* was significant. It appears that participants were significantly more likely to experience curiosity when asked to write a pro-choice essay compared to a pro-life essay, *irrespective* of their actual positions on abortion. The main effect of *actual position* and the *instructed* \times *position* interaction were not significant for curiosity.

The *instructed position* \times *actual position* interaction was significant for boredom. This interaction was probed by dividing the data on the basis of actual position and regressing boredom on instructed position. The results indicated that the pro-choice participants were less likely ($B = -.735$) to report boredom when writing pro-choice essays compared to pro-life essays. However, the pro-life participants were more likely to report boredom ($B = .547$) when writing pro-choice essays compared to pro-life essays (See Figure 1).

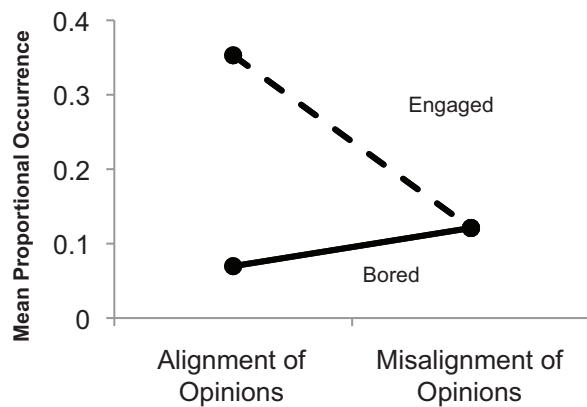


Fig. 1. Alignment vs. Misalignment of Instructed Essay Position and Actual Opinions Trends

The *instructed position* \times *actual position* interaction for engagement was also significant and showed an opposite pattern to boredom. There was significantly more engagement ($B = .474$) when the pro-choice participants

wrote pro-choice essays compared to pro-life essays. Conversely, there was significantly less engagement ($B = -.322$) when the pro-life participants wrote pro-choice essays compared to pro-life essays.

Taken together, these results suggest that the (mis)alignment of instructed and actual position impact boredom and engagement levels during writing. Boredom is more likely to occur when there is misalignment but engagement is higher when there is alignment (see Figure 1). These results are intuitively plausible and are consistent predictions from the control-value theory of emotions (Pekrun et al. 2007).

Predicting Essay Quality

Since we found a difference in affective states based on alignment, we investigated if there was a difference in quality of essays based on alignment. A paired samples t-test comparing the quality score of essays between the aligned ($M = 3.48$, $SD = 1.38$) and misaligned essays ($M = 3.36$, $SD = 1.41$) revealed there was no significant difference, $t(41) = -.525$, $p > .05$.

The results have indicated that boredom, engagement, and curiosity were the affective states that were influenced by the (mis)alignment between the instructed position and actual position on abortion. But were these states associated with writing outcomes? This question was addressed by constructing a mixed effects linear regression model with essay score as the dependent variable. Participant and order of instructed position were the random effects. Boredom, engagement, and curiosity were included as the categorical fixed effects and were all significant predictors of essay quality. Boredom negatively predicted essay scores ($B = -.118$), whereas engagement/flow ($B = .111$) and curiosity ($B = .152$) positively predicted essay quality. These coefficients are in expected directions with respect to what is known about the harmful effects of boredom and the benefit of engagement and curiosity (Craig et al. 2004; Pekrun et al. 2010).

Alignment and Pre-Perceptions of Writing

We also investigated if perceptions before writing differed based on the alignment or misalignment of positions (See Table 2 for descriptive statistics). There were no alignment differences for potential effort, comfort, or confidence in writing about abortion. However, participants reported more interest when writing aligned essays ($M = 4.40$, $SD = 1.43$) compared to misaligned essays ($M = 3.43$, $SD = 1.61$), $t(41) = -2.92$, $p = .006$.

The finding that participants' interest in writing covaried as a function of (mis)alignment between their actual positions and instructed positions raised the question of whether interest is related to affect? We proceeded by proportionalizing the distribution of affect reports, so that

for every participant and essay the sum of proportions for the affective states equaled 1.0. Since the distributions of affective states significantly violated assumptions of normality, non-parametric tests were used for these analyses. A correlation between affective states and interest revealed that interest was negatively related to boredom ($\rho = -.333, p = .031$), as well as slightly positively correlated with curiosity ($\rho = .170, p = .281$) but not with flow/engagement ($\rho = -.115, p = .467$). This suggests that perceived interest before writing ever begins is reliably related to lower levels of boredom.

Table 2. Descriptive Statistics for Paired Samples t-tests

	Alignment <i>M</i> (<i>SD</i>)	Misalignment <i>M</i> (<i>SD</i>)	<i>d</i>
Pre-Writing Questions			
Potential Effort	5.33 (.650)	5.17 (.762)	.212
Confident about Writing	4.43 (1.33)	4.12 (1.38)	.166
Comfortable with Writing	4.86 (1.37)	4.26 (1.67)	.261
Interest in Writing	4.40 (1.48)	3.43 (1.61)	*.448
Post-Writing Questions			
Effort Exerted	5.38 (.539)	4.98 (.749)	*.567
Emotionally Involved	4.81 (1.02)	4.33 (1.14)	*.397
Engagement	5.19 (.804)	4.93 (.947)	.252
Quality Rating	4.19 (1.25)	3.98 (1.16)	.189
More Time Needed	3.33 (1.78)	3.67 (1.88)	-.158

Notes. * Paired sample t-test significant, $p < .05$

Alignment and Post-Perceptions of Writing

Post-writing perceptions were also analyzed by conducting paired-samples t-tests to compare differences between aligned essays and misaligned essays (See Table 2). Participants reported being significantly ($p < .05$) more emotionally involved, exerting more effort, and generally being more engaged ($p = .109$) when there was alignment between actual position and instructed position. These perceptions align with the retrospective affect judgment ratings of engagement. Specifically, participants perceived themselves as more engaged when their positions aligned with the instructed position by reporting more effort, emotional involvement, and general engagement.

General Discussion

This paper offers a fine-grained investigation of affect during writing, a topic that is much neglected in the educational, ITS, and writing communities. The present study makes two key contributions to the literature. First, our data indicates that affective states spontaneously occur throughout the writing process with engagement/flow, boredom, confusion, frustration, curiosity, and anxiety

being the most frequent states. Hence, there might be some merits to strategically responding to these states as they arise, a possibility that is discussed in more detail below.

Second, we have shown that a simple matter of (mis)alignment between a writer's actual position on a topic and instructed position can impact what writers bring to the task (more interest before writing), what affective states they experience during the task (more engagement/flow, curiosity, and less boredom), and their retrospective evaluations of the writing task (more effort and emotional involvement). Although there were no alignment effects on writing outcomes, increased levels of engagement/flow and curiosity and lower levels of boredom observed when there was alignment were predictive of writing outcomes. This suggests that affect moderates the effect of (mis)alignment on writing outcomes, a hypothesis that awaits more systematic testing.

These findings have a number of implications for ITSs aiming to help students improve their writing skills. ITSs that can detect affect during writing might respond automatically when disadvantageous emotions arise. For example, since boredom was prevalent during writing and was a negative predictor of writing scores, ITSs might intervene to reengage the writer once boredom is detected. One intervention might include dynamically probing the writer about ideas for the composition (e.g., have you thought of your supporting sentences?). An ITS with boredom-alleviation capabilities has considerable potential to help writers develop proficiency by keeping students engaged in the deliberate practice of writing strategies.

We have begun to make some advances along this front in order to automatically detect if a writer is bored or engaged. We have developed a system that automatically discriminates between these two states in 15 second intervals by analyzing the dynamics of content production (i.e., keystroke patterns and pauses), prospective appraisals of the writing topic (pre-writing survey questions), individual differences in scholastic aptitude, exposure to print, and writing apprehension (not discussed here) (Bixler & D'Mello, in press). We achieved accuracy rates of 87%, which reflects a 37.4% improvement over random guessing, in discriminating boredom from engagement. The next step of this research is to implement and evaluate interventions that respond to the sensed boredom, which awaits further research and technological development.

Our results also suggests there might be some liability in assigning topics where there is misalignment between the writer's position and the instructed position. Therefore, one idea to facilitate engagement is for ITSs to provide choices that align with writers' opinions. Indeed, freedom of choice is an important predictor of curiosity and engagement (Lepper and Woolverton 2002). However, it is also important to realize that students are typically not afforded choice over topics for most educational writing activities

(e.g., class papers, standardized tests). Hence, ITSs might implement cognitive reappraisal techniques before the writing session begins, particularly when students find the topics uninteresting or topics misalign with their beliefs (Strain & D'Mello 2011). For example, an ITS might ask the writer to imagine a situation where he or she must write a high quality essay, despite his or her beliefs on topic X, to gain admission into a top college. This reappraisal technique might help students overcome the negative experience of boredom by providing a motivation for writing, even about topics that do not align with their views.

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