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Reading Between the Lines:

The Lay Assessment of Subclinical Depression from Written Self-Descriptions

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Abstract

This study investigated how laypersons assess sub-clinical depression in others from two forms of written self-descriptions, personal diaries and online blogs. 57 target participants wrote essays describing their personality as they would in each context. Naïve judges then rated targets' depression from the two sets of self-descriptions. The judges achieved high and comparable levels of accuracy in the two self-descriptions by basing their impressions on linguistic cues indicative of depression-related emotional, cognitive, temporal, and social processes. Consistent with the idea that diaries particularly afford the disclosure of socially sensitive concerns whereas online blogs particularly afford the disclosure of socially acceptable concerns, several cues were indicative of depression only in the targets' diaries (sadness words, cognitive mechanism words, metaphysical references) or their online blogs (e.g., swear words, references to sleep). For most of these cues, judges were implicitly aware of their context-specific diagnosticity.

Keywords: personality judgment, zero-acquaintance, language use, lens model, Linguistic Inquiry and Word Count

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A wide range of research has demonstrated that snap judgments of personality made by strangers are often surprisingly accurate (Back, Schmukle, & Egloff, 2008; Gill, Oberlander, & Austin, 2006; Letzring, Wells, & Funder, 2006; Rentfrow & Gosling, 2006; Vazire & Gosling, 2004). Yet, these studies have also shown that with respect to their “judgability”, all traits are not equal. Whereas observable traits like extraversion often jump out right away, private traits such as neuroticism or depression¹ usually remain much more hidden (John & Robins, 1993). In fact, in one recent study, strangers rated how depressed a group of unacquainted targets were based on a representative sample of two days of their social lives (i.e. more than 100 brief ambient sound recordings; Mehl, 2006). Despite an abundance of rather personal information about the targets, namely their naturally-occurring social interactions and activities, the raters were no more accurate than chance in estimating the targets’ levels of depression. In other words, their very strong and consensual impressions had no more validity than a random guess.

Why is depression so difficult to assess in others? And what does it take to accurately judge depression in others? Answering this question is not only of theoretical value, it is also of high practical importance. Ultimately, people often serve as “lay clinicians” and first identify depression in others—for example, by pointing out that someone seems to be not doing well or should seek professional help. Thus, determining how valid such lay assessments of depression are and investigating the processes by which they are formed is an important scientific endeavor with potential practical applications.

As suggested above, one reason why depression may be more difficult to assess than other traits is because of its inherently private nature. Be it to conform to peer pressure or be it

to give off a positive image, people tend to be reluctant to allow other people insight into this socially undesirable part of their emotional landscape. This managing of the public persona on the stage of everyday social life (Goffman, 1959) naturally acts as a major impediment to the accurate judgment of a private emotional trait such as depression (Funder, 1995) and likely accounts for why the judges in Mehl's (2006) study didn't beat chance at estimating the targets' levels of depression despite having access to extensive information about the targets' naturally occurring social lives.

Consistent with the highly private nature of depression, most clinical theories assume that depression is most strongly manifested in thoughts and feelings about the self (e.g. Beck, 1967). In fact, in the DSM-IV, six out of nine core symptoms of depression are cognitive or emotional in nature and thus not directly observable (e.g., depressed mood, feelings of worthlessness and guilt, thoughts of death, fatigue) and only three are behavioral in nature and thus potentially directly observable (e.g., weight loss or gain, in- or hypersomnia, psychomotor agitation or retardation). This suggests that—in contrast to the public social life—thoughts and feelings about the self may provide particularly good information to gauge other people's levels of depression.

Along similar lines, past research has found that strangers can judge emotional traits like Neuroticism with high levels of accuracy on the basis of stream-of-consciousness essays which emulate the natural train of thought—arguably the most direct window into a person's thoughts and feelings (Holleran & Mehl, 2008). This finding suggests that, indeed, thoughts and feelings are saturated with emotional and biographical information relevant for the judgment of private personality traits. The study's real-world generalizability, however, is limited given that in the absence of verbally shared thoughts, people simply do not have access to this kind of information when forming impressions of others. Self-descriptions are another source of private, personality-

relevant information about a person (McAdams, 2007; Pennebaker & Seagal, 1999). Clearly, it is more common to come across a person's verbal self-description than her raw, unedited stream of thoughts.

Two common forms of self-descriptions in which people readily disclose private information about themselves are personal diaries and their modern, virtual counterpart—online blogs. Both forms of self-descriptions foster self-disclosure and therefore provide potentially high quality information about privately-held thoughts and feelings. In many ways, blogs have surpassed personal diary writing in popularity and have functionally replaced handwritten diaries (Cohn, Mehl, & Pennebaker, 2003). However, blogs are increasingly becoming outlets to disclose personal information that is intended for, or at least not restricted from, public consumption. By contrast, personal diaries have remained an arena in which the expressed thoughts and feelings are truly private and inaccessible to others. Thus, it is likely that, although both forms of self-descriptions are saturated with self-relevant information, they capitalize on slightly different aspects. Specifically, diaries may particularly promote the disclosure of concerns the author considers socially sensitive and potentially stigmatizing whereas blogs may particularly promote the disclosure of concerns the author considers acceptable to disclose to other people. With respect to judgments of depression, then, depressed individuals may be more willing to admit to “secret symptoms” such as preoccupation with existential matters (e.g. religion) in a diary and to disclose symptoms that are acceptable to their peers (e.g., somatic complaints) in an online blog.

To the extent that written self-descriptions provide good information for the accurate judgment of subclinical depression, it must be through the language and words that people use in them. Research on psychological aspects of natural language use has demonstrated that the

words people use often serve as linguistic markers of important social, cognitive, and emotional processes (e.g., Anderson, Goldin, Kurita, & Gross, 2008; Cohn et al., 2001; Lyons, Mehl, & Pennebaker, 2006; Pennebaker, Mehl, & Niederhoffer, 2003; Pressman & Cohen, 2007; Rohrbaugh, Mehl, Shoham, Reilly & Ewy, 2008; Simmons, Gordon, & Chambless, 2005). With respect to depression, prior research has found that depression is related to an increased use of first-person singular pronouns (Fast & Funder, in press; Rude, Gortner & Pennebaker, 2004), presumably a marker of an increased self-focus (Anderson et al., 2008; Pyszczynski & Greenberg, 1987). Not surprisingly, depression is further related to the use of more negative and less positive emotion words (Rude et al., 2004). Subclinical depression is also related to a high use of words that indicate cognitive processing and meaning making concerns (e.g., *because*, *realize*, *understand*; Pennebaker et al., 2003) and attributions of negative events found in life-narrative stories (Adler, Kissel, & McAdams, 2006). The frequent use of words that indicate cognitive processing, particularity on global and stable aspects of events (cf. Kamen & Seligman, 1987), is consistent with cognitive theories of depression. Finally, depression has been linked to “being stuck in the past” (Holman & Silver, 1998) which should be reflected in an elevated use of the past tense in written disclosures. This is consistent with findings that the experience of time is often altered in depression such that time is described as empty and standing still which is related to the use of past tense verbiage (Habermas et al., 2008).

A text analysis program like Linguistic Inquiry and Word Count (LIWC; Pennebaker, Francis, & Booth, 2001) that provides computerized counts of words for a set of psychologically-relevant categories can help examine, on the one hand, what linguistic cues, including first-person pronouns, emotion words, cognitive words and verb tenses, are related to depression and, on the other hand, the extent to which these cues are also used when people form impressions of

others about their levels of depression. If strangers manage to make accurate judgments of depression based on written self-descriptions, they must—implicitly or explicitly—recognize what kind of word use “goes with” depression (cf. Mehl, Gosling, & Pennebaker, 2006).

Overview of the Study and Research Questions

The purpose of this study was to examine how laypersons assess subclinical depression from two common forms of written self-descriptions: traditional personal diaries and their modern counterpart, online blogs. Specifically, we pursued two research questions.

Question 1: How accurate are lay assessments of depression from written self-descriptions? As depression is most directly manifested in thoughts and feelings about the self, and as personal diaries and online blogs are naturally saturated with information about such self-relevant thoughts and feelings, we expect that both forms of self-descriptions will facilitate accurate lay assessments of depression. We predict that judges will achieve significant and substantial levels of accuracy in both conditions, similar to the levels documented by prior research using written stream-of-consciousness essays (Holleran & Mehl, 2008).

Question 2: How is depression assessed from written self-descriptions? What are the valid cues to depression and what cues do laypersons use to assess depression? If levels of depression can be accurately gauged from written self-descriptions, this implies that they must contain reliable cues for depression. As indicated above, the words people naturally use in their self-descriptions are arguably the best candidate for being such cues. We can then ask two questions: (a) How is depression manifested in the targets’ word use in the self-descriptions? (b) And how do judges use information about the targets’ word use to form their impressions of the target’s levels of depression? Brunswik’s (1956) lens model provides a framework to examine the relationship between linguistic cues in the self-descriptions, judges’ perceptions of

depression, and targets' actual levels of depression. In lens model terms, "cue utilization" refers to the correspondence between the observable cue (e.g. use of sadness words) and judges' perceptions of the targets' standing on the trait or construct (i.e. perceived depression). "Cue validity" refers to the correspondence between observable cues (e.g. use of sadness words) and targets' actual position on the given trait or construct (e.g. self-reported depressive symptoms). According to the lens model, accuracy (or "functional achievement") results when judges correctly utilize valid cues and ignore invalid cues to the targets' depression.

Our cue analysis will focus on linguistic indicators of emotional, cognitive, social and temporal processes as captured by LIWC (cf. Anderson et al., 2008; Cohn et al., 2004; Lyons et al., 2006). Based on prior research, we predict that targets' use of more negative emotion words, less positive emotion words, more cognitive mechanism words, more first person singular pronouns, and more past tense verbs will be related to higher levels of depression. Given the high degree of self-disclosure in both personal diaries and online blogs, we expect these relationships to be comparable across the two forms of self-descriptions. However, as described above, given their more private nature, we expect diaries to afford more readily the disclosure of socially sensitive, depression-related concerns. Similarly, given their more public nature, we expect online blogs to afford more readily the disclosure of socially acceptable, depression-related concerns. Consistent with this idea, we predict that references to metaphysical issues (i.e. religion, death) would be more indicative of depression in diaries than in online blogs and references to somatic complaints (i.e. fatigue) would be more indicative of depression in online blogs than in diaries.

Consistent with the expected high levels of accuracy for both self-descriptions, we predict that judges would have a good intuitive grasp of what emotional, cognitive, social, and

temporal cues are and are not indicative of depression (cf. Mehl et al., 2006). Thus, we predict that judges' cue utilization will map well onto the linguistic indicators of depression in the targets' self-descriptions (or in Brunswik's terms, that there will be a high correspondence between cue utilization and cue validity). Given the lack of prior research on the issue, though, we made no specific predictions about the extent to which judges would be intuitively aware of the degree to which the context can potentially render certain cues more diagnostic in one self-description than in the other.

Method

We addressed the two research questions in a study comprised of three phases of data collection. In phase 1, target participants wrote two essays describing their personality as they would in a personal diary and an online blog. In phase 2, two groups of naïve judges read these essays and rated targets' levels of depression. In phase 3, the self-descriptions were content analyzed for the linguistic cues.

Participants

Fifty-seven target participants (introductory psychology students; 49 females; mean age 18.7 years, $SD = 1.7$ years) participated in the study for course credit. A team of eight research assistants (psychology majors; 6 females) served as naïve judges. The judges had no prior contact with the data and did not know any of the targets.

Procedure

Each target participant completed two twelve-minute, computer-based writing assignments. In the two assignments participants described their personality as they would in (a) a personal diary and (b) an online blog. The verbatim instructions were: "*Who are you? Describe yourself as if you were writing about yourself in a personal diary [in an online blog]. How*

would you describe your personality to yourself [to others]? Don't plan out carefully what you are going to write about; just write your thoughts as they naturally come to mind. Don't worry about spelling or grammar. Just write as freely and unrestrained as possible. Again, write about who you are as if you were describing your personality to yourself [to others] in a personal diary [an online blog]. The essay order was counterbalanced.

Assessment of Targets' Depression

Targets' level of depression was assessed with the Beck Depression Inventory (BDI; Beck et al., 1961) which they completed as part of a larger questionnaire battery. The BDI is a 21-item screening instrument to evaluate the presence and severity of depressive symptoms. BDI scores for the sample ranged from 0 – 49 ($M = 6.67$, $SD = 7.55$; Cronbach's $\alpha = .90$). According to the guidelines for interpreting BDI scores (Beck et al., 1961), 11% of the sample evidenced elevated scores. Three participants were borderline depressed (scores 17-20), two moderately depressed (scores 21-30), and 1 extremely depressed (score >40).

Assessment of Perceptions of Depression

Two groups of naïve judges (four judges per team) evaluated each one of the two sets of essays (i.e. personal diary entries only or public blog entries only). This strategy prevented recognition of authors based on idiosyncratic essay features (e.g., content or style). Essays were randomized and the judges were instructed to read each essay and record their impressions of the target's level of depression. Specifically, judges completed the single-item measure "I see the person as someone who is depressed" on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). In zero-acquaintance paradigms, using a global measure of perceived depression is preferable over using a standard depression scale because many symptoms of depression (e.g. weight loss, insomnia or hypersomnia) are inaccessible to

strangers. A global measure of perceived depression also corresponds to how the construct is naturally perceived by lay persons (Mehl, 2006). This measure yielded high inter-judge consensus (ICC [2,4]) in both the personal diary essays (.87) and online blog essays (.78).

Linguistic Analysis of Writing Samples

To evaluate cue utilization and cue validity within the lens model framework, the targets' essays were submitted to Linguistic Inquiry and Word Count (LIWC; Pennebaker, et al., 2001), a text analysis program that provides computerized word counts for psychologically-based linguistic categories. From the 74 LIWC variables, 18 were selected for their theoretical relevance to assessing depression from self-descriptions (Rude, et al. 2004; Pennebaker, et al., 2003). These variables included positive (e.g. happy, joy) and negative (e.g. sad, worthless) emotion words, cognitive mechanism words (e.g. know, think), first person singular pronouns (e.g. I, me), and past tense verbs (e.g. were, had)(see complete list in Table 1) which were aligned with five psychological processes (emotional, cognitive, temporal, social, and personal concerns; Cohn, et al, 2004; Lyons, et al., 2006). Together, these cues provided information about both the thematic content and the linguistic style of the self-description.

To examine the extent to which participants responded differently to the two prompts, we compared the LIWC base rates for the two sets of essays. In the personal diary condition compared to the online blog condition, participants wrote more words ($M = 392$ vs. $M = 352$, $p = .01$), used fewer positive emotion words ($M = 5.4\%$ vs. $M = 4.5\%$, $p = .01$), more negative emotion words ($M = 2.4\%$ vs. $M = 1.8\%$, $p = .01$), and more cognitive mechanism words ($M = 8.6\%$ vs. $M = 6.9\%$, $p = .01$). These differences suggest that targets' self-descriptions were more private (i.e. less socially desirable) and more reflected in the personal diary than in the online blog condition.

Results

Question 1: How accurate were judges lay assessments of depression from the two forms of written self-descriptions?

To examine the accuracy of judges' lay assessments of targets' depression, we correlated the aggregated judge ratings with the targets' scores on the BDI. Consistent with our prediction that judges would achieve substantial accuracy in both forms of self-descriptions, accuracy was .49, ($p = .01$) for the personal diary condition and .57 ($p = .01$) for the online blog condition². The difference between the two accuracy correlations was not statistically significant ($p = .20$). The average pairwise agreement among the judges in diary condition was .65 and .48 in the blog condition. The agreement between the two groups of judges across both conditions was .59. To further examine the degree to which judges in the two conditions picked up on similar or different variance components in the targets' depression, we conducted a multiple regression predicting targets' BDI scores simultaneously from both the judges' ratings in the personal diary condition and the online blog condition. The multiple correlation for the regression model with both predictors was only slightly (and not significantly) larger ($R = .60$, $p < .01$) than either of the two zero-order correlations indicating that the two groups of judges largely drew on similar variance components in targets' depression. Taken together, this suggests that, indeed, written self-descriptions provide good information for accurate lay assessments of depression and that the form of the self-description—a traditional personal diary or a modern online blog—does not make a measurable difference.

Question 2: How was depression assessed from the two forms of written self-descriptions? What were valid cues to depression and what cues did the judges use to assess depression?

To test how judges formed their impressions of targets' depression, we conducted two

lens model analyses—one for each set of self-descriptions. Specifically, for both the personal diary and the online blog condition, we correlated the LIWC-derived cues with (a) the judges' impressions of targets' depression (to track statistical cue utilization) and (b) the targets' BDI scores (to track statistical cue validity). These results are presented in Table 1.

Cue validity in the personal diary versus online blog conditions. Consistent with the idea that depressed people dwell more on the past than on the present (Holman & Silver, 1998), the use of past tense verbs was related to depression in both the personal diaries and the online blogs. Also, consistent with depression being characterized by less positive self-schemas, the use of positive emotion words was negatively related to depression in both forms of descriptions. On the other hand, surprisingly, given that social withdrawal is often considered a core component of depression (Mehl, 2006; Nezlek, Imbrie, & Shean, 1994), LIWC markers of social processes (e.g. social words, first person plural pronouns) were unrelated to depression in either self-description. Also, in contrast to prior research (Rude et al., 2004; Fast & Funder, in press), in neither self-description was depression related to an elevated use of first person singular pronouns as a linguistic marker of an increased self-focus.

Most importantly, though, several cues emerged as uniquely indicative of depression in only one form of self-description. Contrary to our predictions anticipating similarity between the self-descriptions for emotional cues, sadness words were markers of depression only in the personal diaries, and the use of swear words was indicative of depression only in the online blogs. Similarly, the use of cognitive mechanism words, a linguistic marker of meaning making concerns (Pennebaker et al., 2003), was indicative of depression only in the personal diaries. This effect also held for the following subcategories: causation words, insight words, and discrepancy words. Consistent with our predictions that personal diaries afford particularly the

disclosure of socially sensitive depression-related concerns, references to metaphysical issues and religion (e.g. God, pray) were related to depression only in the personal diary condition. Also, consistent with our prediction that online blogs afford particularly the disclosure of socially acceptable, depression-related concerns, references to sleep (e.g. tired, fatigue) were related to depression only in the online blogs. In both cases, Hotelling's t-tests (with Williams Modification) indicated that the pairs of correlations were significantly different from each other.

Cue utilization in the personal diary versus online blog condition. The two cue utilization columns show that the cues that judges used to infer depression were largely the same as those that were in fact related to targets' depression. As a formal measure of the degree of convergence between cue validity and cue utilization, we calculated column-vector correlations (cf. Funder & Sneed, 1993). The column-vector correlation between the cue-validity and cue-utilization correlations was $r = .75$ for the personal diary and $r = .82$ for the online blog condition. The strong correlations indicate that in both conditions judges were good at basing their impressions on the correct (i.e. valid) cues and ignoring invalid ones. This is also consistent with their high level of accuracy in both sets of self-descriptions. Interestingly, judges also seemed to have an intuitive grasp of which cues were exclusively indicative of depression in only one form of self-description. For example, judges were implicitly aware that expressed sadness and meaning making concerns (i.e. cognitive mechanism words) were only suggestive of depression in the personal diaries and that sleep words were only suggestive of depression in the online blogs. They also uniquely—and by and large correctly—inferred depression in the online blogs from the absence of present and future tense verbs. However, the lack of a correlation between perceived depression and the use of metaphysical and religion words suggest that judges failed to pick up on the link between existential concerns and depression in the personal diaries.

Mediation analyses in the personal diary and online blog condition. To provide further evidence that the linguistic cues accounted for the judges' levels of accuracy, we conducted a multiple mediation analysis for each of the two conditions. Multiple mediation allows for a set of potential mediators to be simultaneously tested and is analogous to conducting a regression analysis with a set of predictors (Preacher & Hayes, 2008). In line with traditional guidelines for assessing mediation (Baron & Kenny, 1986), we considered LIWC cues potential mediators if they showed both significant cue validity and significant cue utilization correlations. This way, positive emotion words, sadness words, cognitive mechanism words, and inhibition words were included in the multiple mediation analysis for the personal diary condition and positive emotion words, swear words, past tense verbs, present tense verbs, and sleep words were included in the multiple mediation analysis for the the blog condition.

In the personal diary condition, the results indicated that the selected LIWC cues fully mediated the relationship between judges' ratings of depression and targets' actual levels of depression. Bootstrapping analyses revealed that the inclusion of the set of mediators significantly reduced the total effect (by 86%) and rendered the association between judges' depression ratings and targets' BDI scores non-significant ($b = .36, SE = .67, t(57) = .52, p = .60$). In the blog condition, the results revealed that the selected LIWC cues partially mediated the relationship between judgments of depression and target depression. Bootstrapping analyses revealed that the inclusion of the set of mediators significantly reduced the total effect (by 42%), but the association between judges' depression ratings and the targets' BDI scores remained significant ($b = 2.09, SE = .82, t(57) = 2.53, p = .01$). Follow-up analyses of each of the individual LIWC cues suggested that the partial mediation was driven by the targets' use of swear words in the blog condition.

Discussion

The purpose of this study was to investigate how laypersons assess subclinical depression in others from written self-descriptions. Consistent with our predictions, judges achieved substantial and comparable levels of accuracy when rating targets' depression based on the two forms of written self-descriptions. Also, consistent with our predictions, judges based their impressions on linguistic cues indicative of depression-related emotional, cognitive, temporal and social processes. Finally, consistent with the idea that personal diaries particularly afford the disclosure of socially sensitive concerns whereas online blogs particularly afford the disclosure of socially acceptable concerns, several linguistic cues were indicative of depression only in the targets' personal diary essays (sadness words, cognitive mechanism words, metaphysical references) or their online blog essays (e.g., swear words, references to sleep). Even some of the cues that we predicted to be generally indicative of depression emerged as context specific (e.g., use of negative emotion words and cognitive mechanism words). Interestingly, for most of these cues, judges intuitively used them according to their context-specific diagnosticity.

Private Person Perception Contexts and the Accuracy of Lay Assessments of Depression

Past research has found that depression and other private traits are difficult to judge accurately. Presumably, this is because these traits are less likely to be manifested in contexts that are easily observed by other people (John & Robins, 1993). With the specific purpose of maximizing the availability of private self-relevant information, we chose to examine a person perception context that provides outsiders with a window into a person's thoughts and feelings – written self-descriptions. Our findings are particularly compelling because, unlike prior research on judging depression from (acoustic) information about a person's naturally-occurring social life (Mehl, 2006), these findings demonstrate levels of judgmental accuracy that are similar to

the accuracy obtained when judges have the opportunity to directly “read” a people’s momentary thoughts in form of their stream-of-consciousness essays (Holleran & Mehl, 2008). Across two common forms of written self-descriptions, personal diaries and online blogs, we found evidence that self-descriptions are person perception contexts that can facilitate accurate assessments of a private trait such as depression. On a theoretical level, our findings are consistent with the Realistic Accuracy Model’s (Funder, 1995) postulate that specific contexts can be “diagnostic” for specific traits (i.e. that the accuracy of personality judgments may be subject to trait x information interactions).

In the current study, judges achieved a substantial level of accuracy by relying on linguistic cues contained in the targets’ essays that were indicative of depression. Consistent with prior research on linguistic markers of depression, using more negative emotion words (Rude et al., 2004), more cognitive mechanism words (Pennebaker et al., 2003), and more past tense (Holman & Silver, 1998) was related to targets’ levels of depression in both the personal diaries and online blogs. Inconsistent with prior research (Rude, et al., 2004), though, depression was not related to using more first-person singular pronouns. It is possible that the self-focused task demands (i.e. to describe oneself in form of a written self-description) reduced between-person variability in the use of first-person singular pronouns and thereby constrained a potential relationship between depression and self-referencing. Further, consistent with research on the accuracy of implicit folk theories of personality (Mehl et al., 2006), judges had a rather good intuitive grasp of these relationships as indicated by their use of the correct cues to infer targets’ levels of depression.

In addition, we found several context-specific cues which judges used to infer depression differently across the personal diaries and online blogs. Due to the private nature of personal

diaries, we anticipated that these self-descriptions would be an arena fit for the discussion of potentially socially sensitive depression-related concerns, such as concerns with metaphysical issues (i.e., life, death, and faith). By contrast, public self-descriptions in the blog condition were expected to contain linguistic cues of more socially acceptable depression-related concerns, including somatic symptoms of depression (i.e., sleep, fatigue). Our results confirmed this pattern: linguistic cues of metaphysical and religious concerns were valid cues of depression in the personal diary condition, and sleep words were valid cues of depression in online blog condition. Not only were these cues strongly predictive of depression in their respective contexts, they were *exclusively* predictive in these contexts. Although we did not predict the context-specificity for the validity of sadness words and swear words to depression, the two findings appear to follow our overall logic of how personal diaries and online blogs differ with respect to self-presentational concerns. Among students, the use of sadness and swear words likely provide two possible ways to express depression-related negative emotions. Whereas, the use of swear words may be a particularly acceptable way of sharing negative emotions with peers, the expression of sadness may be more socially stigmatized and therefore more likely confined to private acts of self-disclosure. The swear words finding is consistent with work on the psychological importance of swear words (cf. Jay, in press). Montagu (1942) argued that swearing can be a way to release negative impulses in public without being socially ostracized. Consistent with this idea, using profanity in public might be one way to let negative emotions breathe and get a chuckle from others, while potentially avoiding the negative social implications of being “outed” as depressed. This way, social norms could render the use sadness and swear words differentially diagnostic of depression in personal diaries and online blogs. Future research should directly test this hypothesis, for example by contrasting blogs that are

deliberately shared with a broad compared to a narrow audience (e.g., all friends versus best friends only).

Another unexpected finding was the context specificity in the cue utilization of cognitive mechanism words and present tense verbs. The use of cognitive mechanism words was indicative of depression only in the diary and not in the blog condition and the use of less present tense was indicative of depression only in the blog and not in the diary condition. A potential explanation of these differences may be that diaries allow for a deeper processing of information and blogs allow for a more superficial recounting of past events and feelings (cf. Lyubomirsky, Sousa, & Dickerhoof, 2006). This difference in level of processing might result from the implied audience in the blogs and the lack thereof in the personal diaries. In sum, the differences in cue validity and utilization we found in this study provide first, although only indirect, evidence that students may reveal different aspects of their depression in personal diaries and online blogs (e.g., metaphysical concerns, somatic complaints). Future research should further explore this idea, for example, by directly manipulating factors such as level of processing, the presence or absence of an implied audience and different self-presentational concerns. In addition, as our analyses of socially sensitive v. socially acceptable information was limited to word categories available in LIWC, future research should explore broader definitions and coding procedures to assess these constructs.

On a methodological level, our study was unique in that it was the first to use a within-subject design that experimentally manipulated different forms of self-descriptions and thereby allowed participants' language use to differ across their two essays (cf. Fast & Funder, 2008; Pennebaker & King, 1997). Theoretically, our findings indicate that the psychological implications of the words people use to describe themselves depend to some extent on the

communicative context in which the words are used (Biber, 1988). Consequently, it is important to recognize the potential context-specificity of verbal cues when designing person perception studies. Often, in lens model studies on everyday personality judgments, comparisons are made exclusively between participants instead of also within participants (e.g. Mehl, 2006; Gosling et al., 2002; Vazire et al., 2008). Our findings provide first evidence that it can be useful to examine systematic within-person differences in personality expression and perception.

In this regard, self-descriptions constitute a powerful medium for studying such within-person person perception effects. Unlike other contexts of self-expression (e.g., websites, bedrooms, offices), self-descriptions readily lend themselves to experimental manipulation. By keeping their central content (i.e. self-descriptions of personality) constant across conditions and by selectively manipulating peripheral features (e.g., private vs. public, high vs. low social desirability), it becomes possible to directly test the causal influence of theoretical person perception parameters. One particularly interesting parameter to manipulate in future research might be the quality of the conveyed information, that is, the idea that certain types of information facilitate (or hinder) accurate personality judgments more so than others. Information quality has been postulated to be an important moderator of the accuracy of personality judgments (Funder, 1995) and first empirical evidence in support of this idea is has recently been found (Letzring, Wells, & Funder, 2006). Yet, exactly what constitutes good and bad person-perception information remains largely unknown. We believe that our combined, experimental within-person and correlational between-person lens model approach has the potential of uniquely furthering our understanding of the psychological processes that are implicated when people form first impressions of others.

Limitations and Future Directions

The current study has several limitations. First, participants' self-descriptions were analogs of, not actual, personal diaries and online blogs. As explained above, we did this first and foremost for the sake of experimental control to render participants' personal diary and online blog essays comparable in all other aspects. Both actual personal diaries and actual blogs contain information beyond self-descriptions (e.g., description of daily activities in diaries and third-party posts in blogs) that render direct comparisons of the judges' accuracy and cues use meaningless. One limitation of the personal diary condition is that people rarely have access to a person's personal diary. Personal diaries are inherently meant to be private and not read by other people and there are few circumstances in which there is a real-world parallel to this condition. Therefore, in this study, the diary condition could on some level be considered a "control" condition to assess accuracy under "optimal", that is, maximally-informed conditions. The online blog condition, on the other hand, does have a clear real-world parallel and future research should try to replicate the findings from this study using actual online blogs and other more private forms of online self-presentation (e.g., Lyons et al., 2006).

With the increasing popularity of blogs on social networking sites such as Facebook and MySpace, individuals often make assessments about the well-being and current affective state of friends. Judgments of traits made from social networking sites such as Facebook usually result in a moderate level of accuracy (Gosling, Gaddis, & Vazire, 2007), so it would be beneficial to test if private traits such as depression can be judged in these contexts as well. One feature of these sites is the option for blogs to be private or public, that is, a person can specify the intended audience. We would expect that users who specify their blogs to be visible only to their close friends will post more personally-revealing information that facilitates accurate judgments of depression than users who set their blogs to be publically visible for everyone.

Also, in everyday life, lay assessments of depression are often made by a person's friends, rather than by strangers. In this respect, our study is somewhat un-naturalistic since only strangers made judgments about the targets' levels of depression. In future research, it would be interesting to compare the level of accuracy achieved by close friends and strangers to see if friends have unique insight into their peers' inner mood landscape (cf. Vazire & Mehl, 2008).

Another direction for future research is to examine the extent to which the validity and utilization of cues is gender specific. Previous research indicates that the social manifestations of depression may differ by gender and there are sometimes gender differences in the personality correlates of word use (Fast & Funder, in press; Mehl, et al., 2006). It is possible that linguistic markers of depression differ for males and females and that judges use different language-based cues when rating depression in males and females. Unfortunately, we were unable to explore such gender differences in our sample because of the low number of male targets in our study.

Another limitation of the current study is that we cannot rule out that judges' impressions were influenced by textual information that LIWC failed to capture. For example, linguistic cues that derive their function from the broader, phrase- or sentence-based semantic context (e.g., irony, sarcasm) are not captured by the LIWC's word-count approach but may well have influenced the judges' ratings of targets' depression. The fact that in the personal diary condition, the LIWC cues fully mediated the accuracy effect supports (but still does not confirm) the idea that judges indeed based their impressions on textual information that rather closely resembles what LIWC measured (e.g., perceived sadness of the essay and relative number of sadness words). On the other hand, the fact that in the online blog condition, the LIWC cues only partially mediated the accuracy effect suggests that judges used other textual information that LIWC failed to capture. It is likely that this information is based on such broader, phrase- or

sentence-based semantic context (e.g., “I don’t understand the world around me anymore”).

Interestingly, we found that the partial mediation in the online blog condition was driven by the use of profanity. It is possible that when the judges formed their impressions of the targets, swear words had increased salience compared to other, more subtle linguistic cues, an idea that is consistent with Jay’s (in press) finding that swear words have a stigma (“taboo”) associated with them. Ultimately, though, it is important to note that a Brunswik lens model analysis only provides indirect, correlational and not direct, causal evidence for cue use. Further, it is possible that certain linguistic cues (i.e. meta-physical references, religious words) are difficult for judges to use (e.g., easy to miss) because of their naturally low base rate. Future research could adopt an experimental approach to examine the relationship between language use and lay assessments of depression, for example by manipulating the use of selected linguistic cues to determine their causal effect on judgmental accuracy.

Finally, it is not clear how many participants in our study were clinically depressed. According to the recommended BDI cut-off scores (Beck et al., 1961), the majority of our sample (89%) was non-depressed, but at least three participants would be categorized as moderately or severely depressed. However, clinical scientists and professionals continue to debate the discrete versus continuous nature of depression. The prevailing diagnostic model (i.e. the DSM-IV) conveys the view that depression is a discrete syndrome. Yet, from a continuous (or dimensional) perspective, the recommended BDI cut-offs represent quantitative rather than qualitative delineations of symptom severity. In other words, individuals below a certain (and somewhat arbitrary) critical cutpoint may not merit a discrete, categorical diagnosis, but may still experience distress and symptomatology similar to individuals above the respective cutpoint (see Ruscio & Ruscio, 2000). In this respect, the question then becomes whether our findings based

on subclinical levels of depression can be extrapolated to clinically depressed individuals or would be qualitatively different in such a population.

Apart from how the findings relate to the debate on dimensional versus categorical models of depression, however, our sample of undergraduate students seems highly appropriate for our research question, namely the extent to which students' personal diaries and online blogs can betray their levels of subclinical depression. College students are at a high risk for developing depression (Kessler et al., 2003) and self-descriptions are an important piece of information that peers rely on when trying to figure out whether someone is depressed. Future research should test the extent to which our findings are generalizable to populations that include patients with a confirmed diagnosis of clinical depression. Since we did not conduct clinical interviews, we do not know the extent to which our findings apply to clinical depression. To the extent that they do generalize to this population, they suggest that there may be clinical utility in using linguistic cues for detecting and evaluating depression.

In conclusion, depression has important clinical and social implications. Identifying contexts that allow for accurate judgments of depression has implications beyond the scope of examining *whether* depression can be judged. Instead, this begins to answer the question of *how* depression is accurately judged in different contexts and *when* aspects of the context will demand the use of different judgment processes.

Footnote

¹ Throughout the paper, we use the term “depression” to refer to subclinical depression.

² A Kolmogorov-Smirnov test of the targets’ levels of depression indicated that the distribution of BDI scores significantly departed from a normal distribution. Therefore, we corrected targets’ BDI scores using a square-root transformation and re-computed the accuracy correlations. The analyses yielded comparable accuracy correlations ($r = .47$ in the personal diary condition and $r = .49$ in the online blog condition).

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Table 1

Lens model analysis of judges' lay assessments of depression: Correlations between the LIWC-derived cues and judges' ratings of targets' depression (cue utilization) and the targets' self-ratings of depressive symptoms (cue validity).

LIWC-derived cues	Example word	Cue validity (<i>r</i>)		Cue utilization (<i>r</i>)	
		Personal diary	Online blog	Personal diary	Online blog
<i>Emotional processes</i>					
Positive emotion words	happy, joy	-.38**	-.26*	-.48**	-.37**
Negative emotion words	lonely, worthless	.21	-.05	.35**	.31*
Sadness words	sad, cry	.60**	.11	.52**	.34**
Swear words	damn, fuck	-.04	.58**	-.10	.49**
<i>Cognitive processes</i>					
Cognitive mechanism words	know, cause	.51**	.00	.34**	.01
Causation words	because, why	.26*	-.03	.33	.10
Insight words	think, realize	.38**	.05	.06	-.03
Inhibition words	avoid, forbid	.51**	-.01	.26*	.07
<i>Temporal processes</i>					
Past tense verbs	were, did	.31*	.45**	.22	.43**
Present tense verbs	is, can	.00	-.27*	.07	-.25*
Future tense verbs	be, will	-.09	-.18	.15	-.21
<i>Social processes</i>					
Social words	friend, talk	-.05	.10	.03	-.11
1 st person singular pronouns	I, me, my	.15	-.10	.29*	.04
1 st person plural pronouns	we, us, our	.04	-.06	.13	-.02
<i>Personal concerns</i>					
Metaphysical words	faith, moral	.41**	.12	-.05	.06
Religion words	God, pray	.39**	.07	.01	.03
Death words	dead, grave	.21	.20	-.11	.10
Sleep words	tired, fatigue	-.12	.36**	-.21	.27*

Note. $N = 57$ for targets; $N = 8$ for judges. Targets' depressive symptoms were assessed with the Beck Depression Inventory (BDI). Judges rated targets' depression using a single item measure. LIWC = Linguistic Inquiry and Word Count; the LIWC-derived cues are computed as proportions of the total number of words; indented LIWC variables are subcategories; pairs of cue validity or cue utilization correlations in bold are significantly different from each other (Hotelling's *t*-test with Williams Modification). * $p \leq .05$; ** $p \leq .01$.