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A Study of Self-Disclosure and Awareness

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A Study of Self-Disclosure and Awareness

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Abstract

This study was an attempt to replicate the findings of a 2013 experiment that found self-disclosure can be influenced through priming (Grecco, Robbins, Bartoli & Wolff). The study also concluded that their participants were unaware of the priming effects the experiment had on them. This study challenged this conclusion by manipulating depth of processing across priming conditions as a way of assessing conscious processing of the primes. The priming influence on self-disclosure was not replicated in the present study. Additionally, this study was unable to find a significant main effect of depth. A significant result was found in a memory assessment, suggesting that participants were processing the primes differently at different levels of depth.

A Study of Self-Disclosure and Awareness

Popular cognitive theory assumes some mental processing is done outside of conscious awareness. This assumption relies on participants' inability to explicitly report experimental effects on their behavior. These "implicit cognitions," as cognitive theory defines them, form a great deal of the mind's work, and influence every aspect of our behavior: every automatic association, every action that we do that was not consciously chosen is considered implicit. These cognitions come automatically, effortlessly, and (Chartrand & Bargh, 2002; Lewicki, Hill, & Czyzewska, 1992). Due to the lack of conscious awareness, human behavior can be influenced through priming, to a grand variety of effects, such as influencing self-esteem and body dissatisfaction (Svaldi, Zimmerman, & Naumann, 2012). Cogle and Hawkins (2013) found that women with arachnophobia displayed more courageous behavior if primed with a courage-related word search beforehand. Grecco, Robbins, Bartoli, and Wolff (2013) concluded that by presenting unconscious primes before a test of self-disclosure, the amount of self-disclosure could be affected. The purpose of the present research is to question whether these influences on self-disclosure are unconscious.

Much research has been done on the effects of implicit processing on our behavior. Our implicit biases influence our political orientation (Hawkins & Nosek, 2012). In an Implicit Awareness Test, Quek and Ortony (2012) found that participants favored European-American stimuli over African-American stimuli. Our explicit memories can be contaminated without our awareness, however, word priming can be produced without explicit memory contamination though rapid word presentation (Beauregard, Benhamou, Laurent, & Chertkow, 1999). Our own self-perceptions can be influenced as well, affecting how we view ourselves in our day-to-day lives (Davis, Soref, Villalobos, & Mikulineer, 2016). Bargh and Chartrand (1999) demonstrated

that by having a confederate rub their face or tap their foot, a participant was more likely to mimic that behavior without being able to identify that they were mimicking another person. This supports the idea that our surrounding environment can influence our behavior without our awareness. Much of this research supports a dual-process perspective, drawing a line between the unconscious mind and the conscious one.

Modern cognitive science assumes that mental processing is divided between that which is explicit, and that which is implicit (Evans, 2008). This popular metatheory is known as the dual processing approach. We are aware of, and “in control” of, our explicit processes, but implicit processes are thought to be automatic and unconscious. Much of mental processing takes place outside of awareness, and is not considered conscious. Our automatic processes are fast, but are outside of our control. Explicit processing occurs when we have to consciously consider and deliberate to come to a conclusion or take an action. For instance, in a study by Bialek and De Neys (2017) on utilitarianism, participants intuitively knew that harming others was wrong, but had to engage in deliberation to conclude that harm could be acceptable depending on the consequences. There is some argument as to whether the dual processing metatheory is supported in each case of claimed unconscious thought. In some cases, implicit influences have caused their participants to consciously form rules for their behavior. Dulaney, Carlson, and Dewey (1984) found that subjects could consciously make classifications without having to process a stimuli explicitly, suggesting that they were, on some level, aware of the grammar rules without being able to consciously identify what those rules were.

In one particular study, researchers wanted to examine whether people could be primed to disclose information about themselves (Grecco, et al., 2013). Participants in this experiment were primed with words and phrases related to disclosure (higher sharing of personal information) or

nondisclosure (lower sharing of personal information). In other words, they primed one group to share more information about themselves, and one group to share less. They did this by first having participants in both conditions construct sentences using the priming words. For the disclosure condition these words were “opens,” “shared,” etc., while for nondisclosure these words were “closes,” “kept,” etc. (Appendix A). They then answered self-rating questions that were carefully worded to make the participants agree with them. Again these statements were manipulated between the disclosure and nondisclosure group to further prime participants (Appendix B). After completing the priming tasks, they wrote several essays about themselves. As a result of the experiment, a difference in essay length and personal statements made was found between the two conditions. Participants who were primed to disclose more about themselves wrote more about themselves in these self-descriptive essays than participants who had been primed to disclose less about themselves. Grecco, et al. (2013) concluded that the participants were not aware of the priming effect because, when asked during the debriefing whether they knew the true nature of the study, none of the participants could answer the question correctly. On the basis of this nonanalytic assessment, the researchers claimed that participants were unaware of the priming effects on their behavior. The study’s cover story was that it was a test about readiness for therapy, and when asked what they thought the test was about afterwards, no participants could correctly identify the study’s purpose. One concern with the assumption made in the study by Grecco, et al. is that participants had already been given an answer to the question.

A more analytic approach is required to have conclusive evidence of their awareness. This assumption is made often in research (Barnhardt, 2008), and typically experimenters can conclude that the participant is unaware of the experimental effects without directly assessing

awareness. Instead, I argue that an experiment must directly assess awareness in order to make a statement on how the participants processed the experimental conditions.

One way to investigate awareness of the priming is by manipulating the levels of processing of the priming stimuli. According to levels of processing theory, the level or depth to which an input is processed correlates with the strength that the information can be recalled later. (Craik & Lockhart, 1972; Morris, Bransford, & Franks 1977). We form memories as a result of processing information, and the strength of those memories depends on how they were formed. Craik & Lockhart, the proponents of the levels of processing model, established that structural (appearance) and phonemic (sound) processing constitute “shallow” processing, which only involves maintenance and therefore shorter retention of information. Semantic processing, which is where we attach meaning to new information, involves elaboration and is therefore a deeper process. If an object were processed shallowly (for example, by only registering its shape), we would not be able to recall that object as easily as if it had been deeply processed (e.g., by associating the object with something else). Current research has shown that shallow processing of a stimulus limits the knowledge gained from the stimulus and diminishes the ability to later recall that information (Winne, 2018). Parkin (1979) found that participants, after a surprise recall test, better remembered words that had been paired with a semantic orienting condition than a nonsemantic one. Parkin was able to show that participants were processing the conditions differently, and that led to a difference in later recall.

In the case of Grecco, et al.’s (2013) sentence construction task, it is conceivable that the task induced semantic associations by forcing participants to use the priming words in a sentence. If this is the case, then participants could not have been primed implicitly, as levels of processing theorizes that participants are consciously processing the information. Grecco and

associates concluded, based on their explicit question in debriefing, that their participants were unaware of the priming conditions. I contend that participants were instead deeply processing the information in the priming conditions. By constructing sentences and answering self-rating questions related to their priming conditions, participants were being given a conscious connection to meaning. If these participants could be primed with what would normally be considered a “shallow” processing condition, and shallow processing was shown to have a different effect on self-disclosing behavior, this would suggest an effect of levels of processing, and therefore the conditions of the original study were consciously processed. Grecco, et al. would assume that all participants are completely unaware of the priming effect, and all processing of primes is conducted unconsciously. Therefore they would assume the depth of processing should not matter, and the effect should remain the same.

Grecco, et al. were able to conclude in their study that priming had been effective because a difference between disclosure and nondisclosure results was found. However, their design did not contain a comparison group. As a result, no conclusions could be made on which of the priming conditions, or both, had been effective at priming participants. I improved on the original design by adding a neutral group that receives the same test instructions and essay prompts, but the priming words and phrases are replaced with banalities unrelated to disclosure or nondisclosure. This will provide confirmation whether self-disclosure priming (or priming against self-disclosure) really did occur.

The researchers used an informal method of questioning to assess whether their participants were aware of the priming effects. It is possible that the participants were aware of the experimental conditions, but were not able to explicitly vocalize their awareness. How can an experiment test for awareness without explicit identification? The present study includes a

manipulation of the depth that the priming materials are presented. Considering levels of processing is considered to be conscious, the present study needs only to show that participants are primed differently at different levels of processing to show that awareness plays a role in the priming effect. The present study manipulates levels of processing by considering the original priming tasks, a sentence construction task and self-ratings, as “deeply processed,” while adding a shallow condition, where participants would spend less processing power on each task. In order to keep the priming information “consistent,” the same 5-word sets and self-ratings statements were used. Participants in shallow conditions were instructed to circle words with the letter “N.” Grecco, et al. would expect to see the same results from either a shallow or a deep condition, because the information is being processed in the same way. However, I expect to see a greater priming effect from the deeply processed group, because the participant is spending greater processing power considering the priming condition.

Following the Grecco design, the sentence construction task and the self-assessment were not scored. Their only purpose was to induce an intended behavior. In order to assess the quality of subjects’ self-disclosure essays, multiple quantitative measures were used. Participants’ essay scores were based on both essay length (calculated together as Total Words) and on the number of statements made regarding personal feelings and personal qualities. The feelings and qualities scores were calculated by 3rd-party raters who were not aware of the purpose of the study, to ensure impartiality.

In the Grecco, et al.’s experiment, participants’ inability to freely report the true nature of the study was used as the basis for their lack of awareness. I challenged the validity of that assumption by adding an awareness assessment to the end of the test that might indicate awareness without explicit statements. In the first two tasks, participants indicated words they

believe to be related to the purpose of the sentence construction and self-rating tasks (Referred to as “theme tasks). I aimed to measure participants’ awareness of the priming effect in a more analytical way than Grecco, et al.’s open-ended question. Having scores for each of the theme questions would allow me to compare their level of awareness between-groups. I expected participants in the deep condition to be more accurate in describing the theme of their sentence construction task and self-ratings.

The memory task provides a list of words and asks participants to, without turning back to previous pages, circle any words that they remember appearing on the test. The list is the same for each test, but the number of correct and incorrect answers is different for each condition. Each word on the list appears in some of the conditions but not others. Participants will be scored on both their accuracy at remembering words they encountered on the test, as well as on the number of words they falsely remembered. Because the disclosure and nondisclosure primes are expected to be processed consciously, participants in the deep condition should be more accurate in their memory, and are therefore expected to have a higher proportion of correctly remembered words and a lower proportion of false alarms.

I expected to replicate the results of the Grecco experiment, by finding that the disclosure condition disclosed more than the nondisclosure condition (2013). Their essay lengths were expected to be higher, as well as their personal feelings and qualities scores. I also anticipated an interaction between depth and priming effects: only the deep-processing condition would see a significant difference in word count, feelings, and qualities between the disclosure and nondisclosure conditions. A marked decrease in this priming effect was expected for the shallow conditions. This is expected because the participants are not processing the primes as deeply and are thus less affected by them. The essay length and personal statement values of the neutral

prime condition are expected to be between the disclosure and nondisclosure conditions. There should not be anything implicit in the structure of the test that would influence self-disclosure, and showing no difference between the two neutral groups will support this.

In the study described by this thesis, self-descriptive essays were scored as the primary measure of the effect of priming, examining the total number of words written for the essays, as well as the number of personal feelings and qualities statements made. Priming was manipulated in line with the original design by Grecco, et al., with the addition of a neutral condition. Additionally, levels of processing were manipulated across all priming conditions. Awareness assessment tasks were employed as additional checks for awareness.

My three Hypotheses were as follows:

H1: I expect to reproduce the priming effect found by Grecco, et al. (2013) that deep disclosure participants would be significantly higher than deep nondisclosure in total words written, and in the number of personal feelings and qualities statements made.

H2: I expect to find a main effect of depth on total words and statements made.

H3: An interaction between depth and prime is also expected, such that the shallow priming task will have a diminished effect on total words and statements.

Method

Participants

Participants were 82 volunteers between the ages of 18 and 34. All but four (95.1%) were between 18 and 21. Participants were recruited through psychology classes at Bellarmine University, primarily through the introductory psychology course. Sixty-one were women (74.4%), twenty were men (24.4%), and one person (1.2%) who identified as neither male nor female. This proportion is roughly representative of University population, which reports 68% women and 32% male in fall 2017. Of the 82 participants, 80 (97.6%) reported English as their first language. Their informed consent to participate in the experiment was obtained prior to conducting the experiment in accordance with IRB guidelines.

Design and Materials

In this study, a 2 (depth) x 3 (prime) factorial design was used in which participants were randomly assigned to each of six conditions. Booklets were constructed with different stimuli to manipulate experimentally the factors. Participants were presented with either self-disclosure priming tasks, non-disclosure priming tasks, or tasks that did not present a prime. Treatment combinations were balanced in number of participants in each condition through randomization. The activities (sentence construction sets and self-assessment statements, detailed below) constituted the independent variables while the essays and questions produced the dependent variables. The activities differed in their instructions depending on whether a participant had a shallow priming version or a deep priming version.

In the deep condition, participants first completed a nine-item sentence construction (or sentence scramble) task. This page contained nine sets of five words, and for each of those sets

participants were directed to construct a sentence using at least four of the five given words. The word sets were identical across each condition except for the disclosure, nondisclosure, and neutral items. In the disclosure group one word on each line was primed for disclosure, for example “open” or “share” (see Appendix A). These words were replaced for the Nondisclosure group to prime for nondisclosure, such as “closes” or “concealed.” In neutral groups, these words were not meant to induce a prime at all, and therefore were replaced with words such as “two” and “green.” The word sets were chosen in such a way that it would be difficult to construct a sentence without using the intended priming word.

The next page for deep condition versions contained six self-rating “personality” statements. Participants were instructed to rate their level of agreement or disagreement with each statement on a scale of -3 to 3 (where -3 was completely disagree and 3 was completely agree). The sentences were constructed in such a way that agreement would be induced, and the priming statements would be processed. In the disclosure condition, all statements described a willingness to self-disclose, such as “Sometimes I like talking to people” (see Appendix B). Nondisclosure tests instead had statements involving an unwillingness to self-disclose (e.g., “Sometimes I like being quiet”) Participants in the neutral group rated their agreement on similarly-worded, yet mundane topics (e.g., “Sometimes I like driving on the freeway”). In each condition these statements began with “Sometimes I...” as a way to influence the participant to agree with whichever statement they saw.

Participants in the shallow condition were presented with the same word sets and self-assessment statements as present in the deep condition. Instead of instructions to construct sentences on the first page and rate agreement on the second page, both pages instructed participants to circle every word that included the letter “N.” This letter was chosen because it

appears at least once on each line on both pages, ensuring that participants read each line.

Booklets were not scored if too many mistakes were made on these priming tasks, whether the participant was in the deep or shallow condition.

After these activities, all participants were asked to complete two open-ended essays about themselves (dependent variable). These essay topics were “Please describe the best thing that happened to you in the last 30 days” and “Please describe what you like best about yourself.” These essay prompts were chosen because they carry little risk that the participant would feel coerced into sharing information that they would normally be unwilling to share. Participants were given a full hour to complete the essays.

Participant essays were scored based on the total number of words written for both essays. Additionally, all essays were scored on the number of personal feelings and qualities statements written. Personal Feelings statements were defined as any statement the participant made about how they felt, or an event that they experienced. A Personal Quality statement was defined as any statement the participant made which defined them personally, be it in personality, appearance, talents, etc. Scoring participant essays on Feelings and Qualities was subjective, and so two third-party raters were used to measure those values.

Finally, participants in all conditions completed three tasks about awareness of the priming tasks they had just completed. For each task, they were instructed to circle at least one word and all words that applied. In the first awareness task, participants were presented with a list of 20 words. Five of these words were related to self-disclosure and five to nondisclosure (see Appendix C). The other 10 words were distractors and had no relevance to disclosure or nondisclosure. Participants were asked to circle what they thought might describe the “theme” of the sentence scramble task. The second awareness task presented the same list of 20 words and

asked participants to circle words that would describe the theme of the self-rating task. In scoring these two tasks, I accounted for distractions in the list (i.e. by circling words not related to the prime condition) by scoring the awareness tasks as a ratio of “correct theme words” (words that corresponded to the participants’ priming condition) to the total number of words circled. The perfect score for these tasks was only achievable by identifying only the words related to the prime condition. The third task presented ten words, and asked participants to circle any words that they remember encountering while completing the test. The number of the question explicitly asked that participants not look back at previous pages.

Procedure

Prior to being given their test booklets, participants were given an informed consent form and the experimenter explained that the purpose of the study was to determine an average college students’ “readiness for therapy.” The six booklet conditions were numbered 1-120 and randomized into a certain order, and were handed out to participants in that order. The booklets were kept in a sealed container until handed out to participants during the study, after which they were placed in a separate sealed container. The first page consisted of demographic questions and directions to not continue with the test without direction from the instructor. Participants were then read a script informing them of the structure of the test: first there would be several “activities,” left intentionally vague, followed by two essays, and ending with a few questions regarding the entire experience. The experimenter ensured participants that they had an hour to complete the booklet. Participants were directed to follow directions on each page carefully, and the experimenter gave participants the option to leave after they finished or stay if they wanted to hear more about the study.

Following the experiment description, participants were directed to continue with the remainder of the test. Despite being explicitly given a full hour to complete the test, no participant took more than 30 minutes. After completion of the booklet, the experimenter debriefed participants that the study was not an assessment of readiness for therapy, but rather a study of priming to self-disclose and their awareness of those effects. The experimenter explained that the conditions may have influenced participants to write more or less about themselves, but all essay information would be collected by a third party so as to ensure their privacy.

Results

Essay Length:

The expected self-disclosure priming in the deep process groups was not obtained. Although the mean total word count for the Deep Disclosure group ($M=119.08$) was greater than the word count for Deep Nondisclosure group ($M=97.0$), this result was not significant, $t(24) = 1.35, p = .19$. However, the Shallow Disclosure group wrote only slightly more ($M=120.07$) than the Shallow Nondisclosure group ($M=115.64$), as expected. Total words written for the deep neutral condition ($M=105.67$) was not found to be significantly different than the shallow neutral condition, $M=111.5, p=.57$ (see Figure 1 for means of total words). Broken down by essay, only the second essay produced marginally significant results for participants receiving the deep processing primes, $t(24) = 1.71, p = .10$. The effect of depth of processing on the second essay also approached significance, ($p = .146$). Neither the main effect of priming, $F(2,76) = .44, p = .64$, nor the main effect of depth of processing, $F(1,76) = 1.59, p = .21$, were significant. The interaction of priming condition and depth of process was not significant, $F(2,76) = 1.21, p = .30$. See Table 1 for descriptive statistics per condition.

Table 1

Mean and Standard Deviation by Depth and Prime

	Disclosure				Neutral				Nondisclosure			
	Deep		Shallow		Deep		Shallow		Deep		Shallow	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Total Words	119.1	43.5	120.1	51.5	105.7	44.5	111.5	50.1	97.0	39.6	115.6	68.6
Essay 1	64.1	26.3	63.2	34.0	63.6	28.0	60.3	33.5	55.23	26.2	60.1	45.2
Essay 2	55.0	21.6	56.9	26.6	42.7	22.4	50.2	20.8	41.8	17.8	55.6	28.7
Qualities	1.23	1.09	1.38	1.04	1.11	.70	1.44	.52	1.15	1.07	1.53	.97
Feelings	1.46	1.51	1.15	1.46	.82	1.07	1.11	1.27	.92	.76	.69	.63

Feelings and Qualities:

Two independent raters, unaware of the experiment conditions, scored the essays for personal feelings and qualities statements. Only the statements that both raters agreed on were used in calculations. Raters identified 136 feelings statements, 88 of which were agreed upon. For qualities statements, 175 statements were identified and 106 agreed upon. The agreement rate was 64.7% for feelings statements, and for qualities statements, agreement was 60.6%.

For feeling statements, participants wrote 1.46 feelings statements on average for deep disclosure condition, compared to $M=0.92$ statements for deep nondisclosure, $t(24) = 1.15$, $p=.29$. There were no significant differences between priming conditions for number of feelings statements made $F(2,76) = .84$, $p = .44$. A difference of depth on feelings statements did not produce significant results, $F(1,76) = .119$, $p = .73$. The expected interaction between depth and prime on feelings statements was not significant, $F(2,76) = .69$, $p = .62$.

Similarly, for personal quality statements, the mean number of qualities statements for deep disclosure was 1.23, while deep nondisclosure made mean 1.15 statements, $t(24) = .18$, $p = .97$. Depth of processing had no significant effects on qualities statements made $F(1,76) = 1.32$, $p = .26$. Additionally, there was no significant effect of prime on qualities statements $F(2,76) = .02$, $p = .98$. An interaction between depth of processing and priming condition was not found to be significant for qualities statements, $F(2,76) = .10$, $p = .89$.

Awareness assessment

Theme identification tasks served as a secondary check for awareness. For the task regarding the theme of the Sentence scramble, the awareness score mean for Deep conditions ($M = .564$) trended toward the expectation of being greater than the mean for shallow conditions ($M = .405$), $t(52) = 1.14$, $p = .142$. Differences between deep and shallow conditions were not significant for the second awareness task (Self-Rating theme), $t(52) = .915$, $p = .457$. Neutral conditions were not scored on these measures because those participants were not primed.

Memory Task

The recognition memory test was intended to check the manipulation of depth of processing. On the memory task, deep and shallow groups remembered almost exactly the same proportion of items that they should have remembered ($t(80) = .011$, $p = .997$). Specifically, Participants in the deep group scored .622 on average (on a scale of 0 to 1), while the shallow group scored an average of .621. A significant difference ($t(80) = -1.81$, $p = .034$) in false alarms was found between the shallow and deep groups. Participants in the shallow group made greater errors, suggesting a greater number of associations and false memories.

Discussion

Conclusive results replicating the previous research findings of Grecco et al (2013) were not observed. The original findings by Grecco and associates could not be replicated in the effect of priming on self-disclosure. No significant results were found in terms of the total number of words written for the two essays. Feelings and qualities statements in the two essays were likewise not significantly different for disclosure and nondisclosure. There was no statistically reliable main effect of depth on either the essays or the assessment tasks. Likewise, no interaction was found between depth and prime on the essay variables.

Results from the second of the two essays suggest a trend towards the results expected in Hypothesis 1. Words written for the second essay were suggested to be greater for the deep disclosure condition than deep nondisclosure at a significance level of $p=.10$. The number of feelings statements made by participants on essay two was also marginally significant. The means of total words suggest a trend toward replicating the original results. The difference between deep disclosure and deep nondisclosure was 22.08 words. This is not nearly as robust a difference as the original Grecco, et al. study, which reported a difference of about 50 total words. As I will mention in greater detail below, this study used nine sentence construction tasks while the original study used ten. While it is unlikely that a tenth sentence construction task would lead to an additional difference in means of 30 words to match Grecco and associates' findings, there is the possibility that this difference led to a diminished priming effect.

The difference between the means on shallow disclosure and shallow nondisclosure for total words was only 4.43 words. The greater difference in means between shallow and deep conditions suggests the interaction that I expected: that participants in the shallow conditions would not process their priming tasks as heavily, leading to a diminished effect on primed

behavior. While these findings are not statistically significant, if this were true, it would mean that participants are processing the priming effects consciously, even if they cannot verbally identify them. If there was no effect of depth we would expect the difference in means to be no different.

Depth was also expected to have an effect on participant scores when identifying the theme of the prime conditions, and on scores for the memory assessment. A trend towards significance for the sentence construction awareness task suggests that participants in the deep conditions were better able to identify a theme for the sentence construction task. The fact that an effect of depth was much closer to significance for the sentence theme than the rating theme suggests that the sentence construction task was processed more heavily, and therefore could be a more effective priming tool than the self-rating task. Overall, participants in deep conditions were not found to be more accurate at identifying a theme than if primes were presented shallowly, which suggests that depth of processing had no effect on awareness, at least in terms of identifying a theme.

One interesting finding of this study is that shallow and deep conditions were remarkably similar in their ability to remember words that appeared on the test (Hits), but shallow groups “remembered” significantly more words that did not appear on their version of the test. This suggests that shallow relative to deep processing did not serve as an aid to memory, but increased the frequency of false memories and associations. Further investigation on these findings can be done, investigating which words were falsely identified most frequently, and whether participants were more likely to falsely remember words related to their priming condition. If that were the case it would support the conclusion that shallowly-primed individuals produced more false memories.

Had the expected results been found, several conclusions could be made. Replicating Grecco et al., corroborates their conclusion that self-disclosing behavior can be influenced by priming. If these results were significant, the neutral groups would have helped determine direction of effect between disclosure and nondisclosure. As it stands right now, Grecco and associates found a significant difference between disclosure and nondisclosure, but could not conclude which of those conditions (or both) induced the effect. Since there were no significant effects found in relation to prime, no such conclusions could be made. However, it should be noted that the mean for the deep neutral group ($M=105.67$) is between the values of disclosure ($M=119.08$) and nondisclosure ($M=97.0$), which would suggest that both disclosure and nondisclosure worked as priming conditions. If neutral conditions had been found to be equal to nondisclosure in total words written, for example, I could have concluded that only the disclosure condition had an effect on behavior.

I also expected to find an effect of depth on the awareness assessments. One of these effects was found to be significant, on the number of incorrectly remembered words for the memory task. The theme awareness tasks were meant to assess awareness of the priming conditions without explicitly asking for it. If asked explicitly, the participants most likely would have repeated what Grecco and her associates reported, which was that this was a study of fit for therapy. I expected that this was only the case because it was the answer that they had been given earlier; if they had to put some thought into the answer I might find something different. If I had found that participants in the deep group were capable of identifying the theme of their tasks better than the shallow group, I could have concluded that participants had to have been aware of what was affecting their behavior. They could not have identified a theme if they were unconscious.

The present study was unable to replicate the findings by Grecco, et al. that there was a difference between disclosure and nondisclosure groups. While this may be the result of the present study's own limitations in recreating the conditions that allowed for the original findings, it is also possible that those results cannot be replicated. I recommend that additional research be conducted to determine whether effects found by Grecco and associates can be replicated. If the findings by Grecco, et al. are not replicated in future studies, an experiment measuring an interaction between depth and prime can be adapted from any study of priming that made a statement about awareness.

Since the experiment relied on volunteers from a small subset of the university population, the sample size was small, even when incentivized with extra credit. I expected to have at least 20 participants per condition, for a total of 120 participants. Time constraints and a small population pool (even with expanding the extra credit offer to upper level psychology courses) limited reaching this goal. Instead there were only 82 participants. The random order of the 120 booklets resulted in 13 participants in both deep disclosure and deep nondisclosure, and 18 in deep neutral conditions. There were 14 participants in shallow disclosure, 14 in shallow nondisclosure, and 10 in shallow neutral. A high level of variability is naturally present in a diverse group of people in regards to how much information they are willing to share about themselves, regardless of the condition they were assigned to. The high variability and small sample-size in a 2x3 between-subjects design may account for a lack of statistical significance in confirming the findings of the original study by Grecco, et al. (2013). Readers wishing to explore this topic with further research should consider developing a within-subjects design for this study to reduce variability in the essay scores, specifically the error variability in total word count for

the self-descriptive essays. Participants could be treated across multiple days, given different essays in each priming condition.

Despite my intentions to replicate the original conditions in the study by Grecco and associates, there were several differences in this version. Between the self-ratings task and the essays in the original study were three open-ended questions on participants' views of the effectiveness of psychotherapy. These questions were not scored and only served to reinforce the cover story. I concluded that the other portions of the test were effective enough at maintaining the cover story. Additionally, the original publication listed ten sentence construction tasks and only 9 priming words for each condition. Not wanting to repeat measures or create new priming words, I concluded that nine sentence construction items, in conjunction with the self-ratings, were enough to produce the priming effect. Finally, Grecco et al. in the previous research report that participants were given no time constraints for the essay section. At Bellarmine University, this was impossible as rooms used for the study could only be reserved for an hour. I compensated for this by including in the script that the room was reserved for 1 hour, but no participants took more than 40 minutes, ensuring that participants felt they had ample time to complete their essays.

Limitations to conclusions drawn from the present study's findings were due to some structural and procedural shortcomings. The "sentence theme" awareness task directly asked participants to describe the theme of the sentence scramble task. Likewise the "rating theme" awareness task referred to a series of self-ratings. However, if a participant was in the shallow prime condition, those sections were not titled as "sentence scramble" or "self-ratings," and nowhere else in the test were they identified as such. It is unknown whether this would have influenced the results of the awareness tasks, though it is feasible that participants were confused

by what those tasks were referring to. In a related issue, only the memory task on the awareness assessment instructs participants not to flip back to previous pages. This may have led participants to flip to previous pages when answering the theme awareness tasks, allowing them to search previous tasks for any words or patterns to help identify a theme. In fact, I informally noticed this while conducting the experiment. Further research should include a more refined method of assessing awareness than the theme tasks. While they offer quantifiable results, unlike an informal recall question, the awareness tasks used in the present study may not have been the most accurate or robust form of measurement.

In advertising for participation in the present study, potential participants were told that they would be completing an assessment of “readiness for therapy,” in accordance with the cover story of the study by Grecco, et al. This premise may have led to a selection bias for the participant pool of both the current study and the original by Grecco and associates. This is not expected to have had a major effect on the findings of the study, but it may call the external validity of any findings by either study into question. By advertising for a study about therapy, the cover story may have attracted individuals that are more likely to be influenced by priming effects related to self-disclosure, limiting the generalizability of results found by this study or the study conducted by Grecco, et al. to a larger population.

The findings of the present study may suggest that, for the dependent variables, depth of processing had no effect. If that is the case, I have to conclude that participants are unaware of the priming conditions as stated by Grecco, et al. This is the conclusion that I would have come to, if I had replicated the findings of the original study. If Hypothesis 1 and nothing else was supported by the results of my study, it would suggest that participants were primed successfully but showed no signs of awareness that they were being primed, replicating Grecco et al’s

findings. This was not the case. While trends toward an effect were found, a lack of significant results suggests that the participants were not successfully primed, or were not fully primed. Results were too variable to make definite conclusions. As a result, if the participants could be aware of the priming conditions, their awareness and the experiment's ability to measure their awareness were diminished.

An interaction between depth and prime, if found, would suggest that participants were processing this information differently depending on how it was presented to them. If primes were being processed unconsciously, it should not matter how they are presented, the effect is the same. This finding, especially if found in conjunction with significant results for the theme assessments, would suggest that processing of primes occurred within conscious awareness, even if the participants could not explicitly identify the effects. Using levels of processing to challenge the implicit nature of primes need not be isolated to the framework used by Grecco, et al. Any experiment that found an effect of priming and concluded that the participants were unaware, can be adapted with different levels at which the primes are processed. I believe it will be necessary to demonstrate an interaction (or lack thereof) between depth and priming in multiple situations before a definitive conclusion can be made on awareness of priming.

In future research on awareness of priming, replacing what the current study called the "deep" condition with an even deeper condition could produce more significant results. Semantic information, in a levels of processing framework, is the most deeply processed form that information can take. If, in place of the sentence construction task, participants were given only those nine words that were meant to prime them, and told to write a definition of each word, the primes could be processed at an even deeper level, allowing for even greater change in disclosure behavior. Much more research on this topic is necessary to be able to conclude that priming is

processed at conscious levels. The present study showed that there was a difference in how the priming tasks were processed, however it failed to show that participants were successfully primed. A difference in processing could not have been possible for priming of self-disclosure if all processing occurred unconsciously, as stated by Grecco, et al. Therefore, the present study challenges the assumption of unconscious priming for self-disclosure.

References

- Bargh, J. A., & Chartrand, T. L. (1999). The unbearable automaticity of being. *American Psychologist*, *54*(7), 462-479.
- Barnhardt, T. M., & Geraci, L. (2008). Are awareness questionnaires valid? Investigating the use of posttest questionnaires for assessing awareness in implicit memory tests. *Memory & Cognition*, *36*(1), 53-64. doi:10.3758/MC.36.1.53
- Beauregard, M., Benhamou, J., Laurent, C., & Chertkow, H. (1999). Word Priming Without Awareness: A New Approach to Circumvent Explicit Memory Contamination. *Brain and Cognition*, *39*(3), 149-169.
- Bialek, M., & De Neys, W. (2017). Dual processes and moral conflict: Evidence for deontological reasoners' intuitive utilitarian sensitivity. *Judgment And Decision Making*, *12*(2), 148-167.
- Craik, F. I., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal Of Verbal Learning & Verbal Behavior*, *11*(6), 671-684.
- Cogle, J. R., & Hawkins, K. A. (2013). Priming of Courageous Behavior: Contrast Effects in Spider Fearful Women. *Journal Of Clinical Psychology*, *69*(9), 896-902.
- Davis, D., Soref, A., Villalobos, J., Mikulineer, M. (2016). Priming States of Mind Can Affect Disclosure of Threatening Self-information: Effects of Self-Affirmation, Mortality Salience, and Attachment Orientations. *Law and Human Behavior*, *40* (4) 351-361.

- Dulaney, D., Carlson, R., Dewey, G. (1984). A Case of Syntactical Learning and Judgement: How Conscious and How Abstract? *Journal of Experimental Psychology: General*, *113*(4), 541-555.
- Evans, J. T. (2008). Dual-processing accounts of reasoning, judgment, and social cognition. *Annual Review Of Psychology*, *59*, 255-278.
- Grecco, T., Robbins, S., Bartoli, E., & Wolff, E. (2013). Use of Nonconscious Priming to Promote Self-Disclosure. *Clinical Psychology Science*, *1*(3) 311-315.
- Gulan, T., & Valerjev, P. (2010). Semantic and Related Types of Priming as a Context in Word Recognition. *Annual Review Of Psychology*, *17*(1), 53-58.
- Hawkins, C. B., & Nosek, B. A. (2012). Motivated independence? Implicit party identity predicts political judgments among self-proclaimed independents. *Personality And Social Psychology Bulletin*, *38*(11), 1437-1452.
- Lewicki, P., Hill, T., & Czyzewska, M. (1992). Nonconscious acquisition of information. *American Psychologist*, *47*(6), 796-801.
- Morris, C. D., Bransford, J. D., & Franks, J. J. (1977). Levels of processing versus transfer appropriate processing. *Journal of Verbal Learning and Verbal Behavior*, *16*, 519-533.
- Parkin, A. J. (1979). Specifying levels of processing. *The Quarterly Journal Of Experimental Psychology*, *31*(2), 175-195.
- Quek, B., & Ortony, A. (2012). Assessing implicit attitudes: What can be learned from simulations? *Social Cognition*, *30*(5), 610-630.

Ross, V., Jongen, E. M., Brijs, K., Brijs, T., & Wets, G. (2016). Investigating risky, distracting, and protective peer passenger effects in a dual process framework. *Accident Analysis and Prevention, 93*, 217-225.

Svaldi, J., Zimmermann, S., & Naumann, E. (2012). The impact of an implicit manipulation of self-esteem on body dissatisfaction. *Journal of Behavior Therapy And Experimental Psychiatry, 43*(1), 581-586.

Winne, P. H. (2018). Theorizing and researching levels of processing in self-regulated learning. *British Journal Of Educational Psychology, 88*(1), 9-20.

Appendix A

Sentence Construction Sets

Sets of words used for the sentence construction and word circling tasks

1. door girl wooden opens/closes/two smart
2. rest man tall took long/short/orange
3. parking free/restricted/four campus use students
4. communicate/refuse/summer boy young dog intends
5. lizard big shared/kept/green berries nice
6. energetic talks/listens/three audience happily actor
7. room children heard word/quiet/autumn small
8. television caring leader new announced/concealed/red
9. teenager surprised candid/shy/spring party opinion

Appendix B

*Self-rating Items**Disclosure*

1. Sometimes I like talking to people.
2. Sometimes I like sharing my feelings with others
3. Sometimes I like discussing my problems.
4. Sometimes I enjoy chatting at parties.
5. Sometimes I tell people about my day.
6. Sometimes I like blogging and commenting on social media.

Nondisclosure

1. Sometimes I like being quiet.
2. Sometimes I like holding in my feelings.
3. Sometimes I like keeping to problems to myself.
4. Sometimes I do not talk to people at events.
5. Sometimes I speak with no one all day.
6. Sometimes I like staying off of social media.

Neutral

1. Sometimes I like things that come in threes.
2. Sometimes I do not like the winter season.
3. Sometimes I like driving on the freeway.
4. Sometimes I enjoy a good hamburger.
5. Sometimes I go shopping at night.
6. Sometimes I like learning new recipes.

Appendix C

Word list for theme question

Achievement	Tasteful	Telling	Caring
Learning	Restriction	Disclosing	Keeping
Refusing	Thoughts	Myself	Expression
Argumentation	Openness	Obvious	Concealing
Revealing	Hidden	Others	Analytic

Figure 1

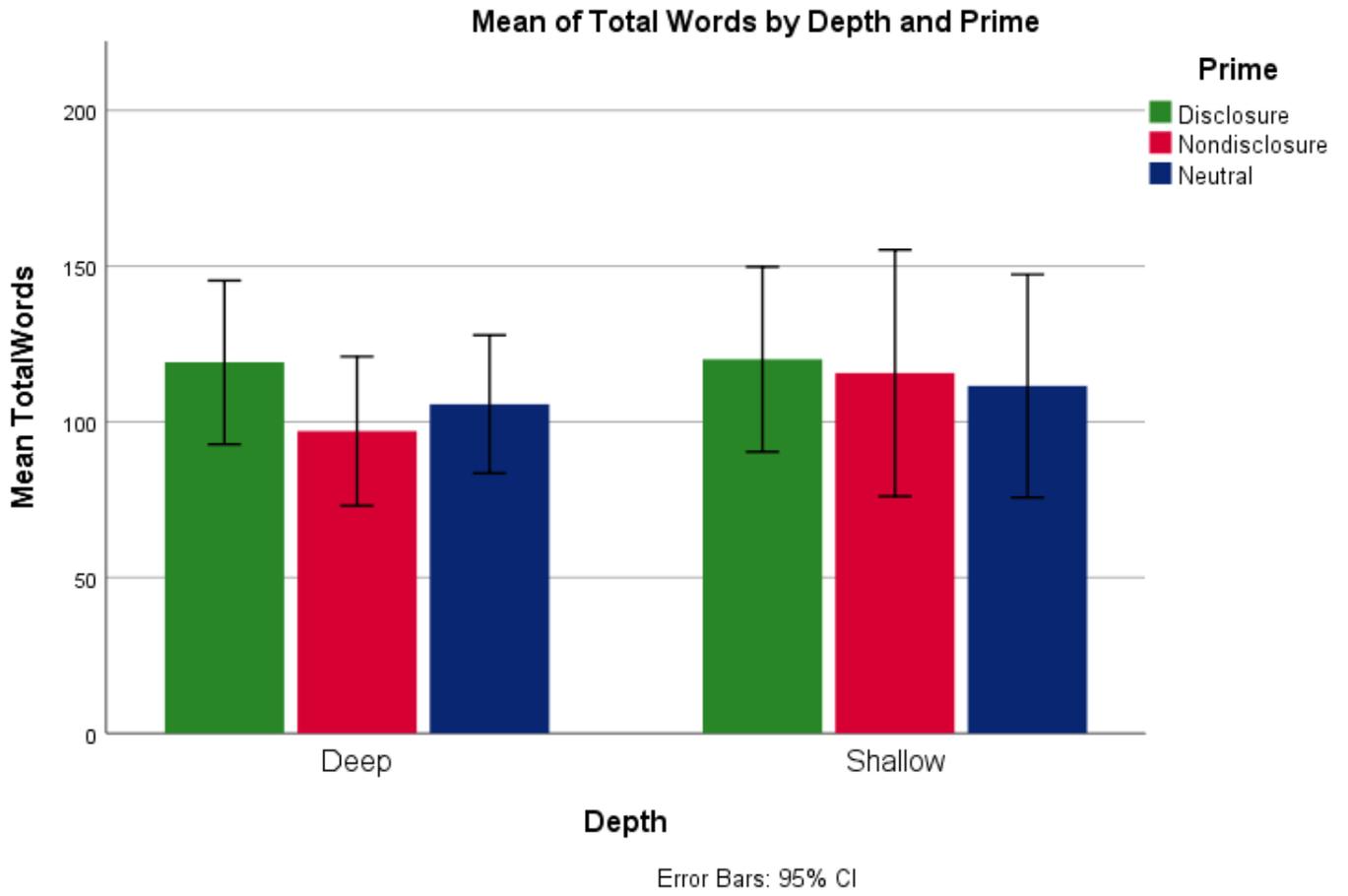


Figure 2

