The Influence of Mood on Cognition

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I. Methods

Participants: We will work with students from the PSYCH 125 Principles of Psychology class. There are no exclusionary criteria to participate in this study. The demographic of participants will have approximately equal gender distribution of college students between the ages of 18 and 21 years. They will receive 1/2 course credit for their participation, and they will be able to choose between this study and others available on the moodle page. We will aim to recruit 30 - 40 participants for the project via a recruitment text posted on their Moodle classroom (See Appendix A).

Design: The independent variable in our experiment will be the mental state of participants via select questions from the PHQ-9 and GAD-7 questionnaires compiled in a Google Forms survey. The dependent variable will be the accuracy of word recall in the Deese, Roediger, and McDermott (DRM) false memory tasks. Critical methods for control will include self-report bias and comfort with discussing mental health. Self-report bias is difficult to control for, but we will include a statement at the beginning of the survey about answering the questions to the best of your ability with the knowledge that we will not use the data collected for anything other than the study, and participant responses will be anonymized. Participants can also opt out at any point if needed. An additional method of control is participants playing the audio recording more than once. We will attempt to prevent this via the Honor Pledge and a statement at the beginning about answering to the best of each participant's ability. We will also take into account and potentially remove outliers from the data if it is clear a participant has clicked through extremes on the Likert scale with no discernable pattern, because we flip the scales to be able to better determine if this was the participant's result.

Materials: Our materials will include two standard DRM word lists (See Appendix B). The DRM false memory test is designed to assess false recognition in participants via the presence of a critical lures through related words in the list to disrupt encoding. Participants who report the critical lure when tested have falsely recognized a word that was not in the list. We will also use the GAD-7 and PHQ-9 questionnaire forms (minus question nine about suicidal intent/ideation on the PHQ-9) developed by Spitzer and colleagues (1999). The GAD-7 questionnaire is designed to measure severity of anxiety symptoms for conditions such as Generalized Anxiety Disorder (GAD) or clinical anxiety. The PHQ-9 is designed to assess severity of depressive symptoms in individuals with clinical depression. Each question on the questionnaire asks participants to rate the severity of their symptoms on a Likert Scale. An answer of "1" to a question means "little to no experience of the described symptom", whereas "7" means "all of the time." The total score is compared with a scale to rank the anxiety of an individual's symptoms. We will not be using these scores as diagnostic criteria as mental health professionals may in the field, but rather plot the scores on the graphs to indicate general trends and potential correlations. We will use Google Forms, in which all survey questions and tests will be administered.

Procedure: Students will complete the experiment via a Google Form (See Appendix C). Initially consenting on the Informed Consent page (See Appendix D). We will administer the DRM task via four pre-recorded audio lists of words (See Appendix E). We will record ourselves reading the standard DRM task lists split into four recordings, one for each list. Participants will play the first recording on the Google Form and asked to only play it once. On the next page they will then be asked to select any words they believe to have heard during the audio recording in a multiple choice questionnaire. One word will be a critical lure, which, if selected, would indicate

a false memory was created. This process will be repeated again, for the second recording presentation. Next, participants will fill out a survey about their mental health, including the GAD-7 and PHQ-9 questionnaires. Based on respondent answers to this survey, we will assess if there are correlations between certain mental illnesses (such as anxiety, depression, and/or mood disorders) and susceptibility to false memory. Finally, participants will be presented with a debriefing statement (See Appendix F).

II. Expected Results

Our hypothesis is that there will be a correlation between higher scores on the GAD-7 and PHQ-9 questionnaires and mistakes on the DRM task. This is particularly the case for depression, as many previous studies have shown that depression makes people particularly susceptible to false memory (Moritz et. al 2018, Dewhurst et. al 2016). For participants with high anxiety scores, we do not expect to see as strong of a correlation, since it is primarily negative memories that are likely to be subject to false memory for individuals suffering from anxiety. In general, we expect that having a higher score on these mental illness questionnaires would correlate to having more errors on the DRM task. Having these questionnaires allows us to quantify how much people believe their mental illness impacts their daily life and thus how much they perceive this task might be affected.

III. Implications

Previous research suggests that people suffering from depression are particularly vulnerable to false memory phenomena (Moritz et. al 2018, Dewhurst et. al 2016). Moritz et. al (2018) found that metacognitive training for depression could lower the effects of false memory.

Current research suggests that for negative memories, people with anxiety are also more susceptible to false memory than people with no mental illnesses (Toffalini et. al 2015). We hope that this study will allow for a better understanding of the effect of mental illness on memory and how this can be used for therapeutic purposes. This study will build upon previous research by investigating the DRM task and how it can be used to measure false memory, such as in the studies investigated in the meta-analysis conducted by Dewhurst et. al (2016). Our findings can perhaps lead to a more robust understanding of how mental illness and false memory relate, then aiding in the development of new therapy techniques to aid those living with mental illness.

IV. References

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Appendix A

RECRUITMENT TEXT

Are you interested in participating in a short Psychology experiment investigating the influence of certain mental health conditions on memory recall? If so, **click here to sign up to complete this study!** We believe that this research is important in furthering our understanding of the influence that moods and states of mind may have on cognition. This survey will take less than 30 minutes and provide 0.5 participation credits. So, if you would like to be part of a valuable research study, we look forward to having you participate!

Appendix B

KEY FOR AUDIO RECORDING QUESTIONS

Word list #1:

RIPE
CITRUS
VEGETABLE
JUICE
COCKTAIL
BANANA
ORANGE
BASKET
BOWL
SALAD
BERRY
KIWI
PEAR
APPLE
CHERRY

Fruit - Critical Word

Word list #2:

DESK
CUSHION
COUCH
BENCH
SIT
SWIVEL
SOFA
RECLINER
ROCKING
SITTING
LEGS
TABLE
SEAT
WOOD
STOOL

Chair - Critical Word

Word list #3:

DELAY
LETHARGIC
MOLASSES
SLUGGISH
TRAFFIC
WAIT
HESITANT
SPEED
FAST
LISTLESS
STOP
SNAIL
QUICK
TURTLE
CAUTIOUS

Slow- Critical Word

Word list #4:
HAND
SMELL
TOE
WALK
KICK
ANKLE
INCH
MOUTH
SANDALS
ARM
YARD
SOCK
BOOT
SOCCER
SHOE

Foot- Critical Word

Appendix C

QUESTIONNAIRE ON GOOGLE FORMS

Page I. Informed Consent Statement (See Appendix B)

Do you consent to participate in the following experiment?

Indicate Yes or No via multiple choice answer

"If you would like a copy of the Informed Consent statement, please email the researchers."

Page 2. Demographic Information

I. Subject number (?)
II. Age (fill in blank)
III. What best describes your gender Identity?
    A. Female
    B. Male
    C. Non-binary
    D. Other
    E. Prefer not to say
IV. Please be aware that your demographic data collected through this form will be used if you attend the experiment, but your identity (name and email provided) will always remain anonymous. Do you consent to these terms?
    A. Yes
    B. No, I would not like to participate in this experiment anymore.

Page 2. Please listen to the following recording once only. After listening, continue to the next page to record your responses.

(Present Appendix C Word List 1)

Page 4.

I. Please mark all words you recall from the recording:
    A. CITRUS
    B. JUICE
    C. PLATTER
    D. FRUIT

E. PEAR
F. CHALK
G. CHERRY

Page 5. Again, please listen to the following recording once only. After listening, continue to the next page to record your responses.

(Present Appendix C Word List 2)

Page 6.

I. Please mark all words you recall from the recording:
    A. DESK
    B. COUCH
    C. CHAIR
    D. SEAT
    E. STOOL

Page 7. Survey on Generalized Anxiety

Please answer the following questions to the best of your ability. The following questions are concerning Anxiety.

I. Have you ever been diagnosed with a Generalized Anxiety Disorder?
    A. Yes
    B. No
    C. Prefer not to say

Measuring these questions on a likert scale

Over the last two weeks, how often have you been bothered by the following problems?

I. Feeling nervous, anxious, or on edge
    A. Answer on a likert scale of 0-3
II. Not being able to stop or control worrying
    A. Answer on a likert scale of 0-3
III. Worrying too much about different things
    A. Answer on a likert scale of 0-3
IV. Trouble relaxing

A. Answer on a likert scale of 0-3

V. Being so restless that it is hard to sit still
   A. Answer on a likert scale of 0-3

VI. Becoming easily annoyed or irritable
   A. Answer on a likert scale of 0-3

VII. Feeling afraid, as if something awful might happen
   A. Answer on a likert scale of 0-3

If you have indicated a 1 or higher for any of the above questions, how difficult have they made it for you to do your work, take care of things at home, or get along with other people? (multiple choice question)

- Not difficult at all
- Somewhat difficult
- Very difficult
- Extremely difficult

Page 8. Survey on Depression

Please answer the following questions to the best of your ability. The following questions are concerning Depression.

II. Have you ever been diagnosed with Depression?
   A. Yes
   B. No
   C. Prefer not to say

Measuring these questions on a Likert scale

Over the last two weeks, how often have you been bothered by the following problems?

I. Little interest or pleasure in doing things?
   A. Answer on a likert scale of 0-3

II. Feeling down, depressed, or hopeless?
   A. Answer on a likert scale of 0-3

III. Trouble falling or staying asleep, or sleeping too much?
   A. Answer on a likert scale of 0-3

IV. Feeling tired or having little energy?
   A. Answer on a likert scale of 0-3

V. Poor appetite or overeating?
   A. Answer on a likert scale of 0-3

VI. Feeling bad about yourself– or that you are a failure or have let yourself or your family down?
    A. Answer on a likert scale of 0-3

VII. Trouble concentrating on things, such as reading the newspaper or watching television?
    A. Answer on a likert scale of 0-3

VIII. Moving or speaking so slowly that other people could have noticed? Or so fidgety or restless that you have been moving a lot more than usual?
    A. Answer on a likert scale of 0-3

If you have indicated a 1 or higher for any of the above questions, how difficult have they made it for you to do your work, take care of things at home, or get along with other people? (multiple choice question)

- Not difficult at all
- Somewhat difficult
- Very difficult
- Extremely difficult

1. How would you describe your mood in one word from the list below:

- Happy
- Sad
- Calm
- Content
- Confused

2. How would you describe your mental state today? (answer on a likert scale)

1(not great) 2(neutral) 3(great)

Page 9. Debriefing Statement (See Appendix F)

Appendix D

INFORMED CONSENT

Do Depression and Generalized Anxiety Influence False Memory?
Informed Consent Form

1. *INTRODUCTION*

You have been invited to participate in a research study investigating False Memory in college-age students both with or without depression and/or generalized anxiety. You are invited as a participant because you are a student in this semester's Psych 125 research pool. You are not required to participate, so please read over this document carefully and ask any pertinent questions before agreeing to participate in the study.

2. *BACKGROUND*

In our Cognitive Psychology class, we have the opportunity to conduct a research experiment. Participants will have the chance to fill out a self survey on depression and anxiety before listening to a recording of two lists of words and being asked to recall the words in the lists by a multiple choice question. So, we are conducting an experiment to better understand the influence that depression and anxiety may have on one's propensity to establish false memory. The results from this study will further explore the literature on false memory.

3. *DURATION*

Your participation in the entirety of this study will require approximately 20-30 minutes.

4. *PROCEDURES*

As part of this study, you will be asked to listen to a list of words and to attempt to recall them. Please only listen to the list of words once and try your best to recall the words without re-listening.

5. *RISKS/BENEFITS*

Participation in this study involves no known risks.

You will not receive monetary compensation for participating, but this experiment will count towards the required research hours in the Psychology 125 course curriculum.

6. *CONFIDENTIALITY*

Your responses collected in this study will be kept confidential and private. Demographic information will be collected in the questionnaire but names will not be and the only people with access to your data will be the student investigators and the faculty supervisor. No one at any other school or institution will have access to your data. Your responses will be analyzed with all of the other participants and no one individual will be identified or singled out. There will be approximately x participants in the study, and all materials will be destroyed after completion of this course. Written reports will never include information making it possible to identify specific participants.

7. *VOLUNTARY NATURE OF THE STUDY*

Your decision regarding participation in this study will not affect your relationship with other students or faculty in the Psychology Department in any way, nor will it affect your overall learning. If you decide to participate, you are free to withdraw at any time without penalty or other adverse effects. If you wish to withdraw, please tell either the faculty supervisor or one of the student investigators that you want to stop the experiment. Your data will be promptly removed from the study.

8. *CONTACTS AND QUESTIONS*

If you have any questions regarding your participation, feel free to ask them now. If questions occur later, you may contact any of the student investigators or faculty advisors for this study.

Student Investigators:
Estelle Huskins - huskin1@stolaf.edu
Steena Johnson - Johns44@stolaf.edu
Adrieanna Summers - summer2@stolaf.edu
Helen White - white17@stolaf.edu

Instructor:
Jessica Petok petok@stolaf.edu

If you have any questions or concerns that you would like to discuss with someone other than those listed above, you may contact Professor Chuck Huff, Institutional Review Board Chair at St. Olaf College (huff@stolaf.edu), or Professor Gary Muir, Psychology Department Chair at St. Olaf College (muir@stolaf.edu).

9. *STATEMENT OF CONSENT*

The procedures of this study have been explained to me and my questions or concerns have been addressed. The information that I provide will remain confidential and for research purposes only. I understand that my participation is voluntary and that I can withdraw at any time without consequence. If I have any concerns about my experience in this study, I may contact the Chair of the Institutional Review Board or the Chair of the department regarding my concerns.

Participant Signature and Date

Signature and Date of Person Obtaining Consent

Appendix E

SCRIPT FOR AUDIO RECORDING

“Word list #1:

RIPE
CITRUS
VEGETABLE
JUICE
COCKTAIL
BANANA
ORANGE
BASKET
BOWL
SALAD
BERRY
KIWI
PEAR
APPLE
CHERRY”

*break in between recordings to record repsonses

“Word list #2:

DESK
CUSHION
COUCH
BENCH
SIT
SWIVEL
SOFA
RECLINER
ROCKING
SITTING
LEGS
TABLE
SEAT
WOOD
STOOL”

Appendix F

DEBRIEFING STATEMENT

Thank you for participating in our study! Upon your completion, we would like to provide you with information on the actual depth of our study and its complete purpose.

The full title of this research study is: "Do Depression and Generalized Anxiety Influence False Memory?" We will analyze how the mental state of participants over the past two weeks affects their false memory creation. Our study involved two standard Deere, Roediger, and McDermott (DRM) word lists, the Generalized Anxiety Disorder-7 (GAD-7) form, and a modified version of the Patient Health Questionnaire-9 (PHQ-9) form.

The DRM false memory test is designed to assess false recognition in participants via the presence of a critical lures through related words in the list meant to disrupt encoding. Participants who report the critical lure when tested have falsely recognized a word that was not in the list. In Dewhurst et al. (2016), the idea that relating information to future events will help increase memory is challenged in the context of the DRM task because of the critical lure's effect. The application of memory tactics such as grouping words for future recollection actually inhibits accurate encoding. The GAD-7 questionnaire is intended to measure anxiety symptoms in participants. The modified PHQ-9 is meant to gauge the severity of depressive symptoms of participants.

Based on previous research suggesting that people with depression are more susceptible to false memories, we hypothesize that higher scores on the PHQ-9 will lead to a higher number of mistakes in the DRM false memory tests (Moritz et. al 2018, Dewhurst et. al 2016). However, we do not anticipate seeing the same strength in this trend with higher reported scores on the GAD-7 as research suggests that false memories are more likely to become apparent when

particularly negative experiences occur, not generalized nervousness or anxiety (Mirandola and Pazzaglia 2021, Toffalini et. al 2015).

We will be doing a correlational analysis of your responses to the DRM false memory tests and the two psychological tests (the GAD-7 and the modified PHQ-9) in order to come to a conclusion. This study will allow for a better understanding of the effect of mental illness on memory.

Please note that we chose to leave certain details out of the start of the survey to ensure accuracy of responses as you might have performed differently if you were aware that we were testing for false memory. Please refrain from speaking to your peers about the true nature of this study for at least two weeks in order to maintain the integrity of the study. If you have any questions about this, please feel free to contact us.

If you found your psychological testing results were higher than you expected or would like them to be, consider reaching out to a mental health professional. Here are a couple on-campus resources:

St Olaf's Counseling Center: https://wp.stolaf.edu/counseling-center/

TimelyCare (FREE, 24/7 help with student email): https://app.timelycare.com/auth/login

Additional assistance: https://wp.stolaf.edu/counseling-center/index-2/mentalhealth/

Thanks again for your participation!

Estelle Huskins - huskin1@stolaf.edu
Steena Johnson - Johns44@stolaf.edu
Adrieanna Summers - summer2@stolaf.edu
Helen White - white17@stolaf.edu

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