Study Title: **EEG Correlates of Consciousness**

Principal Investigator Name: Quinlan Mewborne, Christina Nielsen

Faculty Mentor Name (if applicable): Jessica Green

A. SPECIFIC AIMS

The overarching goal of this study is to better understand differences in how the brain processes the same information when it is consciously perceived compared to when we are unaware of it. Previous research in this area has focused on conscious awareness of simple shapes (Goodhew, Pratt, 2013) or complex objects like faces or houses (Gross & Holmes, 1984). Here, we aim to understand how the emotional expressions of faces modulates our conscious awareness of them and the neural signatures of their processing. Additionally, we will investigate how symptoms of depression and anxiety correlate with individual differences in electroencephalogram (EEG) markers of conscious processing. Examining how the brain functions when presented with stimuli of varying perceivability is critical to uncovering the differences between unconsciousness and conscious awareness, and the context of emotion processing will provide a greater understanding of how mood and anxiety disorders may influence what we perceive in our environment. By studying visual processing of facial stimuli in the absence of awareness, we anticipate gaining a greater understanding of the nature of consciousness and the underlying neural differences in depression and anxiety.

B. BACKGROUND AND SIGNIFICANCE

Although we think of our "thought" as only what we are consciously aware of, the brain has constant activity that does not meet the threshold for us to become consciously aware of it. We are the near-constant recipients of visual information and yet only portions of that information will reach the threshold for conscious awareness. In recent years, more attention has been given to examining the roots of conscious awareness and how the brain determines which stimuli are worthy of reaching this threshold. Previous research using EEG has found that one factor influencing conscious detection is the phase of the alpha rhythm in posterior brain regions (Mathewson et al., 2009). When images were presented at the low point of a subject's alpha wave, they were less likely to detect it. This supports the theory that the determinates of conscious awareness are within the brain and can thus be examined used EEG methods.

We ourselves are unaware of influences that occur outside of our awareness, but studies have shown that biases exist in the brain's choice of images to focus on (Harris, et al, 2018). Smokers, for instance, are more likely have their attention captured by smoking-related images, even when the given stimulus does not meet threshold for conscious awareness. According to neurocognitive theories and studies, participants with depression tend to have a conscious bias toward negative emotional stimuli and emotional processing deficits (Yang, et al., 2011).

However, there is inconsistent data on whether unconscious deficits in emotion processing are present in participants with major depressive disorder (MDD) (Yang, et al., 2011). Automatic processing biases may influence conscious focus of visual sensory information in healthy and depressed persons. One study found that depressive perception may be influenced by these automatic processing biases which may contribute to depressive moods and negative cognitive biases (Sterzer, et al, 2011). Although another study found that healthy individuals showed an unconscious preference for negative emotional stimuli while this was absent in patients with MDD, leading to the assumption of an underlying difference in unconscious visual processing between groups (Yang et al., 2011).

All of this research points to the fact that the brain controls what becomes conscious stimulus and that it can be predisposed to act in one manner, or another based on factors such as addiction or other mental health disorders. This study is designed to build upon prior research by further assessing neurological processing of unconscious facial stimuli across participants with a range of depression and anxiety symptoms.

C. PRELIMINARY STUDIES

I have not conducted any preliminary studies pertinent to this protocol.

D. RESEARCH DESIGN AND METHODS AND DATA ANALYSIS

Location: The study will be available on SONA for students to sign up for and informal communication in classes and online will be used to inform students of study availability. Both data collection and analysis will occur at the Institute for Mind and Brain building affiliated with the University of South Carolina's Psychology Department.

Questionnaires: Each participant will complete several questionnaires before the experiment while the EEG cap is being fitted. Four of the surveys will address the presence of attention-based symptoms common to Autism, Dyslexia, Attention-Deficit Disorder (ADD), and reading issues that are known to covary with attention. The Beck Depression Inventory-II (BDI-II), a 21-item self-report multiple-choice inventory will be used to assess symptoms of depression based on the raw score scale for non-clinical settings (Jackson-Koku, 2016). The Beck Anxiety Inventory (BAI) questionnaire is a twenty-one item, self-report questionnaire that will assess participants' level of anxiety. All questionnaires are non-diagnostic surveys that will be used to study individual differences in task performance and scores will not be shared with participants. At the end of their participation session, all participants will receive a written debriefing form that describes the purpose of the study and provides them with information about mental health resources available on campus.

Visual Search Protocol: The following protocol was adapted from experimental procedures previously used to study perceptual awareness of non-emotional face stimuli (Harris et al., 2013). Face stimuli will be presented to participants equipped with electroencephalogram (EEG) caps on a computer screen following the established protocol of masked and unmasked trials and three target conditions (positive, negative, and neutral faces). The stimulus array consists of distractors

and targets of the same size and shape. For every trial, the subject will be observing 15 distractors and one target that is highlighted with four dots, one in each corner of the target object. The target will appear in either the top left or right or the bottom left of right spots with equal probability. Subjects are then asked to identify if the target in question was a positive, negative, or neutral face. On Unmasked trials, the four dots surrounding the target will offset at the same time as the face and perception of the face and its emotional expression should be unimpeded. On Masked trials, the four dots will remain on the screen for 500 ms following the face, reducing perceptual processing of the stimulus (object-substitution masking; refs). Masked and unmasked trials will be randomly intermixed.

EEG Procedure: Participant's brain activity will be recorded using EEG. The procedure for recording EEG involves placing an elastic cap containing up to 64 electrodes on the participant's head and filling each one with a conductive saline-based gel. The signals detected by the electrodes are then amplified and sent to a computer via USB for storage and analysis. It typically takes between 20-30 minutes to place the cap on the participant's head and prepare the electrodes for recording.

Data Analyses: EEG analyses will be performed using a combination of commercial software (Brain Vision Analyzer) and freely available software (MATLAB-based programs: EEGLAB, ERPLAB, FieldTrip, SPM; sLORETA). Each program is specialized for specific portions of the analysis, such as creating event-related potentials (ERPLAB), analysis of data in the time-frequency domain (EEGLAB), and source localization of ERP (sLORETA) and time-frequency data (FieldTrip). Analyses of behavioral data (response times, accuracy) and correlations between these, neural measures, and the questionnaire data will be performed using SAS or in-house software written in MATLAB.

Time Table:					
Project Month (2018-2019)	August	September	October	November	December
Project Task					
Submit for IRB approval	X	X			
Experimental Design and training	X	X	X		
Recruit subjects		X	X	X	
Data collection			X	X	X
Analysis of data				X	X

Final report write-up and submission				X	X

1. Target Population: All participants will be healthy young adults (age 18-40) who are fluent in English and have normal or corrected-to-normal vision and normal hearing. Selection is independent of gender and ethnicity. This study will include a total of 40 participants.

Gender and minority inclusion: As stated earlier, no participants will be excluded based on gender or race/ethnicity. Children will not be enrolled in the study. It is expected that the gender and racial composition of the study sample will mirror the greater Columbia population composition seen in Table 1.

Table 1. Racial and ethnic composition of the greater Columbia, SC area.

	Am. Indian, Alaskan Native	Asian, Pacific Islander	Black, not of Hispanic Origin	White, not of Hispanic Origin	Other, Unknown	Total
Greater Columbia Area (%)	0.3	1.5	32.5	64.7	1.0	100
Target – Male (n)	0	0	6	13	1	20
Female (n)	0	0	6	13	1	20

2. Recruiting Plans: Recruitment will be performed through the psychology undergraduate subject pool and through advertisements on the PIs website.

3. Existing Data/Samples: not applicable

4. Consent/Assent: Consent will be obtained by the PI or by lab researchers (postdocs, graduate students, or research assistants) who have completed all required IRB training and have been trained by the PI. The researcher will outline the main section of the consent form for the participant and remind them of their right to withdraw consent at any time during the experiment.

The participant will then be given as much time as needed to review the consent form and ask any questions. The process typically takes less than 10 minutes.

5. Potential Risks: The risks to participants are minimal, although there is a slight risk of breach of confidentiality despite any steps taken to protect participants' privacy.

All questionnaires and screening questions are framed as requiring voluntary responses only. Participants can choose to withdraw from the study without penalty if they do not wish to provide the requested information. All study data are anonymized and only contain a subject number. All identifying information is stored in locked cabinets that only study personnel can access.

During EEG recording, participants may feel some mild discomfort from the pressure of the elastic electrode cap on their head or the application of the conductive gel. Some of the gel will also remain in the participant's hair when the electrode cap is removed, but this gel will easily wash out. Standard non-invasive EEG recording techniques are used and the research assistants have all been trained to minimize subject discomfort. Facilities are available in the lab for participants to wash their hair.

Participants are encouraged to reach out to the primary investigator of the study regarding any questions about the study itself. They are also encouraged to reach out to Lisa Johnson, the Assistant Director in the Office of Research Compliance, with any questions pertaining to their rights as a research subject. The payment for any unforeseen costs incurred will be covered by the account funding this study. The IRB will be notified immediately by the P.I. if any adverse events were to occur at any point in the study.

6. Potential Benefits: There will be no direct benefit to people who participate in this study. However, the results may improve our understanding of EEG correlates of conscious awareness.

7. Confidentiality: Consent forms that contain identifying information will be housed in a locked filing cabinet within a locked office that only the researchers will have access to. All other materials (questionnaires, electronic data files, subsequent analyses) will identify participants only by number and will not contain any information that could identify the participant.

All desktop computers and laptops used for data acquisition and analysis are password protected and only accessible to study personnel. In addition, no data contain any identifying information and are only labeled with subject numbers.

8. Compensation: Students can receive experimental credit for participation in the study based on the total number of hours of participation (e.g., One hour of credit per hour of participation).

9. Withdrawal: The participants are given a full description of the study and informed both verbally and in writing (in the consent form) that they can withdraw during the study at any time, without negative consequence.

Research involving benign behavioral interventions in conjunction with the collection of information from an adult subject through verbal or written responses (including data entry) or audiovisual recording if the subject prospectively agrees to the intervention and information collection and at least one of the following criteria is met:

A. The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects;

B. Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation; or

C. The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by 46.111(a)(7).

(ii) For the purpose of this provision, benign behavioral interventions are brief in duration, harmless, painless, not physically invasive, not likely to have a significant adverse lasting impact on the subjects, and the investigator has no reason to think the subjects will find the interventions offensive or embarrassing. Provided all such criteria are met, examples of such benign behavioral interventions would include having the subjects play an online game, having them solve puzzles under various noise conditions, or having them decide how to allocate a nominal amount of received cash between themselves and someone else.

(iii) If the research involves deceiving the subjects regarding the nature or purposes of the research, this exemption is not applicable unless the subject authorizes the deception through a prospective agreement to participate in research in circumstances in which the subject is informed that he or she will be unaware of or misled regarding the nature or purposes of the research.

F. REFERENCES/LITERATURE CITATIONS

Goodhew, S. C., Pratt, J., Dux, P. E., and Ferber, S. (2013). Substituting objects from consciousness: A review of object substitution masking. *Psychonomic Bulletin & Review, 20*(5), 859 - 877. doi: https://doi.org/10.3758/s13423-013-0400-9

Holmes, E. J., and Gross, C. G. (1984). Effects of inferior temporal lesions o discrimination of stimuli differing in orientation. *Journal of Neuroscience, 4*(12), 3063–3068. doi:

Harris, J. A., Donohue, S. E., Ilse, A., Schoenfeld, M. A., Heinze, H. J., & Woldorff, M. G.(2018). EEG measures of brain activity reveal that smoking-related images capture the attention of smokers outside of awareness. *Neuropsychologia, 111,* 324–333.

Harris, J. A., Ku, S., Woldorff, M. G. (2013). Neural processing stages during object-substitution masking and their relationship to perceptual awareness. *Neuropsychologia, 51,* 1907–1917. https://doi.org/10.1016/j.neuropsychologia.2013.05.023

Jackson-Koku, G. (2016). Beck Depression Inventory. *Occupational Medicine, 66*(2),174–175. doi:10.1093/occmed/kqv087

Mathewson, K. E., Gratton, G., Fabiani, M., Beck, D. M., and Ro, T. (2009). To see or not to see: prestimulus alpha phase predicts visual awareness. *J. Neurosci.* 29, 2725–2732.

Sterzer, P., Hilgenfeldt, T., Freudenberg, P., Bermpohl, F., Adli, M. (2011). Access of emotional information to visual awareness in patients with major depressive disorder. *41*(8),1615-24. doi: 10.1017/S0033291710002540

Yang, Z., Zhao, J., Jiang, Y., Li, C., Wang, J., Weng, X., Northoff, G. (2011). Altered Negative Unconscious Processing in Major Depressive Disorder: An Exploratory Neuropsychological Study. *PLoS One, 6*(7), e21881. doi: 10.1371/journal.pone.0021881

G. APPENDIX

BDI Questionnaire:

Beck's Depression Inventory

This depression inventory can be self-scored. The scoring scale is at the end of the questionnaire.

1.
- 0 I do not feel sad.
- 1 I feel sad
- 2 I am sad all the time and I can't snap out of it.
- 3 I am so sad and unhappy that I can't stand it.

2.
- 0 I am not particularly discouraged about the future.
- 1 I feel discouraged about the future.
- 2 I feel I have nothing to look forward to.
- 3 I feel the future is hopeless and that things cannot improve.

3.
- 0 I do not feel like a failure.
- 1 I feel I have failed more than the average person.
- 2 As I look back on my life, all I can see is a lot of failures.
- 3 I feel I am a complete failure as a person.

4.
- 0 I get as much satisfaction out of things as I used to.
- 1 I don't enjoy things the way I used to.
- 2 I don't get real satisfaction out of anything anymore.
- 3 I am dissatisfied or bored with everything.

5.
- 0 I don't feel particularly guilty
- 1 I feel guilty a good part of the time.
- 2 I feel quite guilty most of the time.
- 3 I feel guilty all of the time.

6.
- 0 I don't feel I am being punished.
- 1 I feel I may be punished.
- 2 I expect to be punished.
- 3 I feel I am being punished.

7.
- 0 I don't feel disappointed in myself.
- 1 I am disappointed in myself.
- 2 I am disgusted with myself.
- 3 I hate myself.

8.
- 0 I don't feel I am any worse than anybody else.
- 1 I am critical of myself for my weaknesses or mistakes.
- 2 I blame myself all the time for my faults.
- 3 I blame myself for everything bad that happens.

9.
- 0 I don't have any thoughts of killing myself.
- 1 I have thoughts of killing myself, but I would not carry them out.
- 2 I would like to kill myself.
- 3 I would kill myself if I had the chance.

10.
- 0 I don't cry any more than usual.
- 1 I cry more now than I used to.
- 2 I cry all the time now.
- 3 I used to be able to cry, but now I can't cry even though I want to.

11.

0 I am no more irritated by things than I ever was.
1 I am slightly more irritated now than usual.
2 I am quite annoyed or irritated a good deal of the time.
3 I feel irritated all the time.

12.

0 I have not lost interest in other people.
1 I am less interested in other people than I used to be.
2 I have lost most of my interest in other people.
3 I have lost all of my interest in other people.

13.

0 I make decisions about as well as I ever could.
1 I put off making decisions more than I used to.
2 I have greater difficulty in making decisions more than I used to.
3 I can't make decisions at all anymore.

14.

0 I don't feel that I look any worse than I used to.
1 I am worried that I am looking old or unattractive.
2 I feel there are permanent changes in my appearance that make me look unattractive
3 I believe that I look ugly.

15.

0 I can work about as well as before.
1 It takes an extra effort to get started at doing something.
2 I have to push myself very hard to do anything.
3 I can't do any work at all.

16.

0 I can sleep as well as usual.
1 I don't sleep as well as I used to.
2 I wake up 1-2 hours earlier than usual and find it hard to get back to sleep.
3 I wake up several hours earlier than I used to and cannot get back to sleep.

17.

0 I don't get more tired than usual.
1 I get tired more easily than I used to.
2 I get tired from doing almost anything.
3 I am too tired to do anything.

18.

0 My appetite is no worse than usual.
1 My appetite is not as good as it used to be.
2 My appetite is much worse now.
3 I have no appetite at all anymore.

19.

0 I haven't lost much weight, if any, lately.
1 I have lost more than five pounds.
2 I have lost more than ten pounds.
3 I have lost more than fifteen pounds.

20.

0	I am no more worried about my health than usual.
1	I am worried about physical problems like aches, pains, upset stomach, or constipation.
2	I am very worried about physical problems and it's hard to think of much else.
3	I am so worried about my physical problems that I cannot think of anything else.

21.

0	I have not noticed any recent change in my interest in sex.
1	I am less interested in sex than I used to be.
2	I have almost no interest in sex.
3	I have lost interest in sex completely.

INTERPRETING THE BECK DEPRESSION INVENTORY

Now that you have completed the questionnaire, add up the score for each of the twenty-one questions by counting the number to the right of each question you marked. The highest possible total for the whole test would be sixty-three. This would mean you circled number three on all twenty-one questions. Since the lowest possible score for each question is zero, the lowest possible score for the test would be zero. This would mean you circles zero on each question. You can evaluate your depression according to the Table below.

Total Score	Levels of Depression
1-10	These ups and downs are considered normal
11-16	Mild mood disturbance
17-20	Borderline clinical depression
21-30	Moderate depression
31-40	Severe depression
over 40	Extreme depression

BAI Questionnaire:

Beck Anxiety Inventory (BAI)

About: This scale is a self-report measure of anxiety.

Items: 21

Reliability:
Internal consistency for the BAI = (Cronbach's α=0.92)
Test-retest reliability (1 week) for the BAI = 0.75 (Beck, Epstein, Brown, & Steer, 1988).

Validity:
The BAI was moderately correlated with the revised Hamilton Anxiety Rating Scale (.51), and mildly correlated with the Hamilton Depression Rating Scale (.25) (Beck et al., 1988)

Scoring:

	Not At All	Mildly but it didn't bother me much	Moderately - it wasn't pleasant at times	Severely – it bothered me a lot
All questions	0	1	2	3

The total score is calculated by finding the sum of the 21 items.
Score of 0 – 21 = low anxiety
Score of 22 – 35 = moderate anxiety
Score of 36 and above = potentially concerning levels of anxiety

References:

Beck, A. T., Epstein, N., Brown, G., Steer, R. A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology, 56,* 893-897.

Beck Anxiety Inventory (BAI)

Below is a list of common symptoms of anxiety. Please carefully read each item in the list. Indicate how much you have been bothered by that symptom during the past month, including today, by circling the number in the corresponding space in the column next to each symptom.

	Not At All	Mildly but it didn't bother me much	Moderately - it wasn't pleasant at times	Severely – it bothered me a lot
Numbness or tingling	☐	☐	☐	☐
Feeling hot	☐	☐	☐	☐
Wobbliness in legs	☐	☐	☐	☐
Unable to relax	☐	☐	☐	☐
Fear of worst happening	☐	☐	☐	☐
Dizzy or lightheaded	☐	☐	☐	☐
Heart pounding/racing	☐	☐	☐	☐
Unsteady	☐	☐	☐	☐
Terrified or afraid	☐	☐	☐	☐
Nervous	☐	☐	☐	☐
Feeling of choking	☐	☐	☐	☐
Hands trembling	☐	☐	☐	☐
Shaky / unsteady	☐	☐	☐	☐
Fear of losing control	☐	☐	☐	☐
Difficulty in breathing	☐	☐	☐	☐
Fear of dying	☐	☐	☐	☐
Scared	☐	☐	☐	☐
Indigestion	☐	☐	☐	☐
Faint / lightheaded	☐	☐	☐	☐
Face flushed	☐	☐	☐	☐
Hot/cold sweats	☐	☐	☐	☐

ADD Questionnaire:

Date: _____ Subject #_____

The items below refer to how you have behaved and felt during most of your adult life. If you have usually been one way and recently have changed, your responses should reflect how you have usually been.
Circle one of the numbers that follows each item using the following scale:

0 = Not at all
1 = Just a little
2 = Somewhat
3 = Moderately
4 = Quite a lot
5 = Very much

	Not at all	1	2	3	4	Very much
At home, work, or school, I find my mind wandering from tasks that are uninteresting or difficult.	0	1	2	3	4	5
I find it difficult to read written material unless it is very interesting or very easy.	0	1	2	3	4	5
Especially in groups, I find it hard to stay focused on what is being said in conversations.	0	1	2	3	4	5
I have a quick temper...a short fuse.	0	1	2	3	4	5
I am irritable, and get upset by minor annoyances.	0	1	2	3	4	5
I say things without thinking, and later regret having said them.	0	1	2	3	4	5
I make quick decisions without thinking enough about their possible bad results.	0	1	2	3	4	5
My relationships with people are made difficult by my tendency to talk first and think later.	0	1	2	3	4	5
My moods have highs and lows.	0	1	2	3	4	5
I have trouble planning in what order to do a series of tasks or activities.	0	1	2	3	4	5
I easily become upset.	0	1	2	3	4	5
I seem to be thin skinned and many things upset me.	0	1	2	3	4	5
I almost always am on the go.	0	1	2	3	4	5
I am more comfortable when moving than when sitting still.	0	1	2	3	4	5
In conversations, I start to answer questions before the questions have been fully asked.	0	1	2	3	4	5
I usually work on more than one project at a time, and fail to finish many of them.	0	1	2	3	4	5
There is a lot of "static" or "chatter" in my head.	0	1	2	3	4	5
Even when sitting quietly, I am usually moving my hands or feet.	0	1	2	3	4	5
In group activities it is hard for me to wait my turn.	0	1	2	3	4	5
My mind gets so cluttered that it is hard for it to function.	0	1	2	3	4	5
My thoughts bounce around as if my mind were a pinball machine.	0	1	2	3	4	5
My brain feels as if it were a television set with all the channels going at once.	0	1	2	3	4	5
I am unable to stop daydreaming.	0	1	2	3	4	5
I am distressed by the disorganized way my brain works.	0	1	2	3	4	5

Autism Quotient Questionnaire:

Date: _____ Subject #_____

Instructions

Below are a list of statements. Please read each statement very carefully and rate how strongly you agree or disagree by marking the appropriate box.

DO NOT SKIP ANY STATEMENTS.

	Definitely agree	**Slightly agree**	**Slightly disagree**	**Definitely disagree**
I prefer to do things with others rather than on my own.				
I prefer to do things the same way over and over again.				
If I try to imagine something, I find it very easy to create a picture in my mind.				
I frequently get so strongly absorbed in one thing that I lose sight of other things.				
I often notice small sounds when others do not.				
I usually notice car number plates or similar strings of information.				
Other people frequently tell me that what I've said is impolite, even though I think it is polite.				
When I'm reading a story, I can easily imagine what the characters might look like.				
I am fascinated by dates.				
In a social group, I can easily keep track of several different people's conversations.				
I find social situations easy.				
I tend to notice details that others do not.				
I would rather go to a library than a party.				
I find making up stories easy.				
I find myself drawn more strongly to people than to things.				
I tend to have very strong interests which I get upset about if I can't pursue.				
I enjoy social chit-chat.				
I am fascinated by numbers.				

	Definitely agree	Slightly agree	Slightly disagree	Definitely disagree
When I'm reading a story, I find it difficult to work out the characters' intentions.				
I don't particularly enjoy reading fiction.				
I find it hard to make new friends.				
I notice patterns in things all the time.				
I would rather go to the theatre than a museum.				
It does not upset me if my daily routine is disturbed.				
I frequently find that I don't know how to keep a conversation going.				
I find it easy to "read between the lines" when someone is talking to me.				
I usually concentrate more on the whole picture, rather than the small details.				
I am not very good at remembering phone numbers.				
I don't usually notice small changes in a situation, or a person's appearance.				
I know how to tell if someone listening to me is getting bored.				
I find it easy to do more than one thing at once.				
When I talk on the phone, I'm not sure when it's my turn to speak.				
I enjoy doing things spontaneously.				
I am often the last to understand the point of a joke.				
I find it easy to work out what someone is thinking or feeling just by looking at their face.				
If there is an interruption, I can switch back to what I was doing very quickly.				
I am good at social chit-chat.				
People often tell me that I keep going on and on about the same thing.				
When I was young, I used to enjoy playing games involving pretending with other children.				

	Definitely agree	Slightly agree	Slightly disagree	Definitely disagree
I like to collect information about categories of things (e.g. types of car, types of bird, types of train, types of plant, etc.).				
I find it difficult to imagine what it would be like to be someone else.				
I like to plan any activities I participate in carefully.				
I enjoy social occasions.				
I find it difficult to work out people's intentions.				
New situations make me anxious.				
I enjoy meeting new people.				
I am a good diplomat.				
I am not very good at remembering people's date of birth.				
I find it very easy to play games with children that involve pretending.				

Revised Adult Dyslexia Checklist (RADC)

Date: _____ Subject #_____

Please check Yes or No to each question. Do not skip any questions. If in doubt, check whichever feels like the truer answer.

	Yes	No
Do you have difficulty in telling left from right?		
Is map reading or finding your way to a strange place confusing?		
Do you dislike reading aloud?		
Do you take longer than you should to read a page of a book?		
Do you find it difficult to remember the sense of what you have read?		
Do you dislike reading long books?		
Is your spelling poor?		
Is your writing difficult to read?		
Do you get confused if you have to speak in public?		
Do you find it difficult to take messages on the telephone and pass them on correctly?		
When you have to say a long word, do you sometime find it difficult to get all the sounds in the right order?		
Do you find it difficult to do sums in your head without using your fingers or paper?		
When using the telephone, do you tend to get the numbers mixed up when you dial?		
Do you find it difficult to say the months of the year forwards in a fluent manner?		
Do you find it difficult to say the months of the year backwards?		
Do you mix up dates and times and miss appointments?		
When writing cheques, do you frequently find yourself making mistakes?		
Do you find forms difficult and confusing?		
Do you mix up bus numbers like 95 and 59?		
Did you find it hard to learn your multiplication tables at school?		

Reading Survey Form

Date: _____ Subject # _____

1) How often do you read for school or work?

____ Every day
____ A few times a week
____ A few times a month
____ Once a month
____ A few times a year
____ Once a year
____ Never

2) How often do you read for pleasure?

____ Every day
____ A few times a week
____ A few times a month
____ Once a month
____ A few times a year
____ Once a year
____ Never

3) What is the typical amount of time you spend reading in one session?

____ Less than 15 minutes
____ 15 – 30 minutes
____ 30 – 60 minutes
____ more than 60 minutes

4) How much do you enjoy reading?

____ like very much
____ like somewhat
____ neither like nor dislike
____ dislike somewhat
____ dislike very much

5) How old were you when you learned how to read? _____

6) How often did you read for pleasure as a child?

____ Every day
____ A few times a week
____ A few times a month
____ Once a month
____ A few times a year
____ Once a year

____ Never

7) What reading format do you prefer? Please rank order your choices using the lists below

____ Reading from a print book
____ Reading from an e-reader device
____ Reading from a computer
____ Reading from your iPhone/smartphone/iPod
____ Reading from a tablet/iPad

8) How often do you use instant messaging services (Skype, Google Hangouts, Facebook messenger, etc.)?
____ Every day
____ A few times a week
____ A few times a month
____ Once a month
____ A few times a year
____ Once a year
____ Never

9) Approximately how many text messages do you send per day? _____

10) Approximately how many text messages do you receive per day? _____

11) How many hours do you spend reading each of the following in a typical week:
(if you never read a particular type of material, leave the space blank)

Printed Format

_____Books (fiction)
_____Books (nonfiction)
_____Plays, short stories, poetry
_____Magazines
_____Newspaper
_____Textbooks/class readings
_____Written material for work

Electronic Format

_____Books (fiction)

_____Books (nonfiction)

_____Plays, short stories, poetry

_____Magazines

_____Newspaper

_____Websites, blogs (written material only, do not include videos, graphics, etc.)

12) How many hours do you spend reading material from the following reading formats in a typical week: *(if you never read from a particular type of format, leave the space blank)*

_____ Reading from a print book
_____ Reading from an e-reader device
_____ Reading from a computer
_____ Reading from your iPhone/smartphone/iPod
_____ Reading from a tablet/iPad