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# Exploring the minimum number of trials needed to accurately detect concealed information using EEG

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The Plymouth Student Scientist

University of Plymouth

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## Appendices

### Appendix A - Health Screening Questionnaire

**DEMOGRAPHICS QUESTIONNAIRE** Date \_\_\_\_\_ Interviewer \_\_\_\_\_ ID \_\_\_\_\_

Date of birth \_\_\_\_\_ Sex: M / F

How many years of formal education have you had: \_\_\_\_\_ years Degree(s) \_\_\_\_\_

- Up to secondary school (16 years old) = 11 years \_\_\_\_\_
- Up to 6<sup>th</sup> form (A-levels) = 13 years \_\_\_\_\_
- Up to University Degree = 16 years \_\_\_\_\_

Is English your first language? *If "N":* Y  N

- What is your country of birth? \_\_\_\_\_
- At what age did you come to the U.K.? \_\_\_\_\_
- At what age did you learn to speak English? \_\_\_\_\_

As a child, were any languages other than English spoken in your home? *If "Y" list:* Y  N

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Is your vision corrected? Y  N

*If "N,":* Is your vision 20/20? Y  N

- Is there anything you have difficulty seeing (e.g. while driving, reading, or watching TV)? Y  N

*If "Y" explain:* \_\_\_\_\_

*If "Y,":* Do you wear Glasses or Contact Lenses & which ones? GL  CL

- Do your glasses/contacts correct your vision to 20/20? Y  N

Your last eye exam occurred (*circle one*): within the last 6 months. within the last year. within the last 2 years. more than 2 years ago. Or Date of current prescription \_\_\_\_\_ (*Circle one*)

It was performed by: optician (a technician at an optical store). optometrist (Dr. who performs eye exams). ophthalmologist (Dr. who treats eye diseases, performs eye surgery, & may perform eye exams). Other: *Explain:* \_\_\_\_\_ (*Circle one*)

Rate the quality of your **near** vision: Excellent Good Fair Poor (*Circle one*)

Rate the quality of your **far** vision: Excellent Good Fair Poor (*Circle one*)

Is your vision in one eye better than the other? Y  N

*If "Y":* Which eye is better? R  L

What difficulty are you having with the other eye? \_\_\_\_\_

Do you currently have or have you ever had:

Glaucoma? Y  N

*If "Y":* In which eye(s)? R  L

Cataracts? Y  N

*If "Y":* In which eye(s)? R  L

Have you had corrective surgery? Y  N

*If "Y":* In which eye(s)? R  L

Lazy eye? Y  N

*If "Y":* In which eye? R  L

Have you had corrective surgery? Y  N

Colour-blindness? Y  N

Other vision problems or eye injuries? Y  N

*If "Y" explain:* \_\_\_\_\_

Have you ever seen a neurologist, psychiatrist, or psychologist for any reason? Y  N

*If "Y" complete the following:* Type of Doctor \_\_\_\_\_

Reason for Visit \_\_\_\_\_

At what age? \_\_\_\_\_ Duration \_\_\_\_\_ Currently seeing? Y  N

Have you ever taken any type of psychological tests (e.g., for another study, as part of job counseling, or for psychological or neuropsychological evaluation)? Y  N

*If "Y" complete the following:* Year Taken \_\_\_\_\_

Describe \_\_\_\_\_

Have you ever had an EEG, MEG; CT, PET, or MRI scan; or head X-ray? Y  N

**If "Y" complete the following:** At what age? \_\_\_\_\_

Type of Test \_\_\_\_\_

Reason for Test \_\_\_\_\_

Have you ever been in a car accident? Y  N

Have you ever been in any other type of serious accident? Y  N

**If "Y" complete the following (circle one or both):**

Describe	Car Accident	Other Accident	
At what age?			
Hospitalized?			
Did you lose consciousness?			Y <input type="checkbox"/> N <input type="checkbox"/>
<b>If "Y", for how long?</b>	_____		
Concussion?			Y <input type="checkbox"/> N <input type="checkbox"/>
Nausea & vomiting?			Y <input type="checkbox"/> N <input type="checkbox"/>
Medications prescribed?			Y <input type="checkbox"/> N <input type="checkbox"/>
Name			
Dosage			
Persistent problems? Memory Loss, Head Ache, Changes in vision (e.g., blurred or double vision), Changes in hearing (e.g., tinnitus)? Other lasting effects _____			<i>Report if any</i>
Have you ever hit your head and been knocked out, suffered a blow to the head and lost consciousness, or injured your head in any other way?			Y <input type="checkbox"/> N <input type="checkbox"/>

**If "Y" complete the following:** Incident One

Describe	Incident Two	
At what age?		
Hospitalized?		
Did you lose consciousness?		Y <input type="checkbox"/> N <input type="checkbox"/>
<b>If "Y", for how long?</b>	_____	
Concussion?		Y <input type="checkbox"/> N <input type="checkbox"/>
Nausea & vomiting?		Y <input type="checkbox"/> N <input type="checkbox"/>
Meds prescribed? Name	Dosage	
Persistent problems? Memory Loss, Head Ache, Changes in vision (e.g., blurred or double vision), Changes in hearing (e.g., tinnitus)? Other lasting effects _____		<i>Report if any</i>
Have you ever been unconscious at any (other) time in your life?		Y <input type="checkbox"/> N <input type="checkbox"/>
<b>If "Y" report duration:</b> _____		
Have you ever had a seizure or convulsion of any kind? <b>If "Y":</b> What was the cause of your seizure/convulsion? _____		Y <input type="checkbox"/> N <input type="checkbox"/>

**For females only:** Are you taking Hormone Replacement Therapy? Y  N

**If "Y":** What are the medications, dosages, frequency of meds? \_\_\_\_\_

What was the date of your last period? \_\_\_\_\_

How frequently do you have your period? every \_\_\_\_\_ days

Do you have or have you ever had:	Y	N	List/Explain
Claustrophobia?	<input type="checkbox"/>	<input type="checkbox"/>	_____
A seizure disorder or epilepsy?	<input type="checkbox"/>	<input type="checkbox"/>	_____
A stroke (CVA) or mini-strokes (TIA)?	<input type="checkbox"/>	<input type="checkbox"/>	_____
Heart disease or heart problems?	<input type="checkbox"/>	<input type="checkbox"/>	_____
Lung problems?	<input type="checkbox"/>	<input type="checkbox"/>	_____
Thyroid problems?	<input type="checkbox"/>	<input type="checkbox"/>	_____
Kidney problems?	<input type="checkbox"/>	<input type="checkbox"/>	_____
Urinary or bowel disorder?	<input type="checkbox"/>	<input type="checkbox"/>	_____
Cancer or tumours?	<input type="checkbox"/>	<input type="checkbox"/>	_____
Diabetes?	<input type="checkbox"/>	<input type="checkbox"/>	_____

High blood pressure or hypertension?   \_\_\_\_\_

Severe headaches?   \_\_\_\_\_

Diagnosis of attention deficit disorder?   \_\_\_\_\_

Diagnosis of autism or Asperger's syndrome?   \_\_\_\_\_

Diagnosis of Alzheimer's disease (AD), probable AD, dementia, or other neurological disorder?   \_\_\_\_\_

Diagnosis of psychiatric or psychological disorder?   \_\_\_\_\_

Have you ever been diagnosed with a learning disorder? *If "Y" explain:* Y  N

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Did anyone ever suspect that you might have a learning disability, such as dyslexia? Y  N

*If "Y" explain:* \_\_\_\_\_

Have you ever had emotional problems requiring treatment (e.g., depression, anxiety, nervous breakdown)? Y  N

*If "Y" list age/date(s) and describe problem(s):* \_\_\_\_\_

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*If "N,"* Have you ever felt seriously depressed or sad for 2 weeks or more? Y  N

*If "Y" complete the following:*

• Describe	Period One	Period Two
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At what age?  
 When did you last feel that way?  
 Longest period of feeling that way?

- Have you been feeling depressed, sad, or anxious at all lately? Y  N

*If "Y":* How long have you been feeling this way? \_\_\_\_\_  
*If "N,"* How would describe your mood recently? \_\_\_\_\_

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Have you ever been hospitalized for any (other) reason in your lifetime? (include Emergency Room.) Y  N

*If "Y" list date(s) & reason(s):* \_\_\_\_\_

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Have you ever consumed alcoholic beverages? Y  N

Do you currently consume alcoholic beverages? *If "Y":* Y  N

- What kind of drink(s) do you usually consume? \_\_\_\_\_
- How many drinks per week do you usually consume?  
 0 <1 1-5 6-10 11-15 16-20 21+ (Circle one)
- Has there ever been a period of time where you typically drank a lot more than the amount you described? *If "Y":*

- How many days per week did you drink? \_\_\_\_\_ Y  N
- How many drinks per day of consumption? \_\_\_\_\_
- Duration of this pattern? \_\_\_\_\_ (Circle one)
- Type: Beer Wine Mixed drinks Liquor PF Y  N

- Have you ever experienced blackouts while drinking? Y  N
- Have you ever experienced withdrawal symptoms when you tried to quit or cut down on your drinking? Y  N
- Have you ever thought that you were an alcoholic? Y  N
- Have you ever been treated for alcoholism? Y  N
- *If "Y" list date(s) & length of sobriety:* \_\_\_\_\_ Y  N
- Have you ever participated in Alcoholics Anonymous or rehab programs? *If "Y" list duration & length of sobriety:* \_\_\_\_\_

When was the last time you had a drink? \_\_\_\_\_

Do you smoke? *If "Y":* How many packs of cigarettes do you smoke per week? Y  N

0 <1 1-5 6-10 11-15 16-20 21+ (Circle one)

Have you ever been addicted to a drug other than alcohol? Y  N

*If "Y" complete the following:*

Name of Drug  
 Frequency—How many:  
 Date Last Used  
 Days Per Week?  
 No. of years?

Have you ever participated in a drug treatment program? *If "Y" complete the following:* Y  N

Dates

Are there any medications that you take on a regular basis? (Please include medications such as aspirin, ibuprofen, vitamins, and herbal supplements.) *If "Y":* Y  N

Name Dosage Reason Prescribed

- 1.
- 2.
- 3.
- 4.

Have you ever had any serious accident or illness other than those already discussed?  
*If "Y" list or explain:* \_\_\_\_\_ Y  N

When you were in grade school, did you have any particular problems with spelling, reading, or mathematics? *If "Y" describe:* \_\_\_\_\_ Y  N

Were you ever placed in any type of "special class"? *If "Y" explain:* \_\_\_\_\_ Y  N

Did you ever repeat a grade? *If "Y" explain:* \_\_\_\_\_ Y  N

As a child, were you considered to have a behaviour problem because of restlessness, distractibility, hyperactivity, acting out, or fighting? *If "Y" the following:* Y  N

At What Age?  
 Describe

Is your hearing impaired in any way or do you have tinnitus (ringing)? Y  N   
*If "Y" explain:* \_\_\_\_\_

Do you have a dermatological or other condition that might result in an adverse reaction to salty gel or surgical tape? *If "Y" explain:* \_\_\_\_\_ Y  N

Do you have any metal jewelry (i.e., piercings)? *If "Y" explain where and indicate whether you can remove these for the EEG session (if unremovable anywhere on head, then exclude):* \_\_\_\_\_ Y  N

Additional Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Handedness** You are (please circle) : **Left Handed**    **Right Handed**    **Ambidextrous**

In the following table please cross your preferred hand for each of the activities or objects. Mark with a single X for a significant preference, or XX if you would be incapable of using the other hand. An X in both hands would indicate that you have no preference.

	L	R		L	R
writing			tennis racket		
drawing			golf club		
throwing			screwdriver		
scissors			hammer		
comb			spoon		
brushing teeth			knife		

## **Appendix B**

### **Brief**

#### **BRIEF**

**Project Title:** Exploring the minimum number of trials needed to accurately detect concealed information using EEG.

**Supervisor:** Dr Giorgio Ganis, University of Plymouth, School of Psychology

**Objective:** The aim of this study is to investigate the minimum number of trials needed to accurately detect the P300 response in recognising concealed dates, using electrophysiological measures.

**Procedure:** We will be taking recordings using EEG (electroencephalogram) whilst we ask you to engage in some simple decision-making processes on dates. This will involve placing an electrode cap on your head.

Study sessions will take up to an hour, of which up to 5 - 10 minutes will be needed to place the EEG electrodes on your head. The remaining time will contain visual study tasks. These tasks will take place during the EEG recording session and will take about 30 minutes in order to obtain sufficient information for a clear interpretation of the results.

Instructions will be given to you on how to complete the task verbally, and you can also follow instructions on the screen. If you have any questions, feel free to ask the experimenter and they will remind you.

After the experimental procedure, you will be debriefed, and an examiner will remove the electrode cap. You will receive 1 participation point per 30 minutes.

If you are willing to take part in this study, please consent by signing your name and the date on the form below. Your details will remain confidential.

**UNIVERSITY OF PLYMOUTH**

**FACULTY OF HEALTH: MEDICINE, DENTISTRY, AND HUMAN SCIENCES**

**CONSENT TO PARTICIPATE IN RESEARCH PROJECT**

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Name of Principal Investigator

Dr. Giorgio Ganis

## **Appendix C - Consent Form**

UNIVERSITY OF PLYMOUTH

FACULTY OF HEALTH: MEDICINE, DENTISTRY, AND HUMAN SCIENCES

CONSENT TO PARTICIPATE IN RESEARCH PROJECT

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Name of Principal Investigator

Dr. Giorgio Ganis

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Exploring the minimum number of trials needed to accurately detect concealed information using EEG.

Brief statement of purpose of work:

In this study we aim to investigate the neural processes involved in recognising dates. To gain a better understanding of how the brain can produce these responses we will use an Electroencephalogram (EEG) to measure the electrical activity during these tasks, specifically the P300.

This EEG procedure is both non-invasive and passive and involves the placement of small electrodes on various locations on your scalp. The procedure used in this experiment is as follows:

1 – You will be fitted with an elastic cap with electrodes.

2 – Each of the electrodes have small sponges attached to them and are soaked with a saline solution to create an electrical connection with the skin. Additional saline solution may be used to improve the connection. The saline solution is hypoallergenic, but let the experimenter know if you feel any discomfort during the procedure.

In addition to the collection of EEG information you will also be asked to fill in a questionnaire used to ascertain basic information related to health, handedness, and education. Full reporting is essential, especially for matters of health, and you will not be penalised if safety concerns preclude your participation in this study.

3 – COVID-related. All procedures will use PPEs, as prescribed by Government regulations: both experimenter(s) and participant will wear face coverings and will minimise talking; the experimenter will also wear a disposable plastic apron and nitrile gloves; the cap and sponges will be disinfected after each use with isopropyl alcohol (70% concentration) or other approved solution (e.g. Sekusept). Participants' temperature will be taken with a disposable thermometer before entering the lab; participants with a temperature higher than 37.8C will not be tested. Similarly, participants with a cough and/or a loss or change to their sense of smell or taste will not be tested.

If you have questions related to any of these procedures the experimenter will be happy to give you further information. Also, in the event of complications arising from the experimental procedure please inform the experimenter as soon possible.

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PLEASE TICK AS APPROPRIATE, AND SIGN & DATE THE FORM

The objectives of this research have been explained to me.

I understand that I am free to withdraw from the research at any stage, and ask for my data to be destroyed if I wish.

I understand that my anonymity is guaranteed.

I understand that the Principal Investigator of this work will have attempted, as far as possible, to avoid any risks, and that safety and health risks will have been separately assessed by appropriate authorities (e.g. under COSHH regulations).

Under these circumstances, I agree to participate in the research.

Name: .....

Signature: .....

Date: .....



## **Appendix D - Debrief**

### **Debrief**

Exploring the minimum number of trials needed to accurately detect concealed information using EEG.

The experiment you have just taken part in was testing whether the amplitude of a specific event-related potential component, the P300, correlates with visual recognition of the stimuli you saw. Usually, the P300 is larger for familiar than unfamiliar stimuli, which is what we expect to find. This should allow us to use the P300 to identify the recognition of concealed dates, which infers a lie. We also examined the minimum number of trials needed to produce accurate P300 responses.

This experiment was loosely based upon the work of Rosenfeld (2019).

Please contact Giorgio Ganis at [giorgio.ganis@plymouth.ac.uk](mailto:giorgio.ganis@plymouth.ac.uk) if you have any questions regarding the experiment.

### **Thank you for your cooperation**

Rosenfeld JP. P300 in detecting concealed information and deception: A review. *Psychophysiology*. 2019;e13362. <https://doi.org/10.1111/psyp.13362>