

CM-5

User Guide



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CM-5 at a glance

1

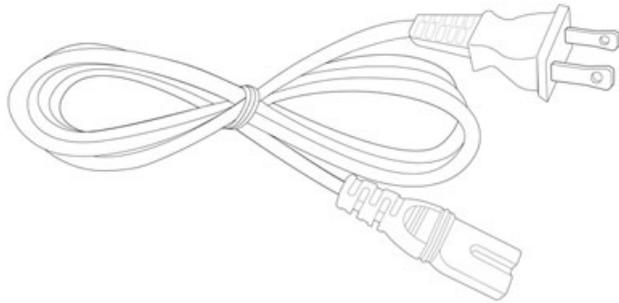
CM-5 Overview

This guide describes the features of the CM-5 Device and the CM-5 App used to control it.

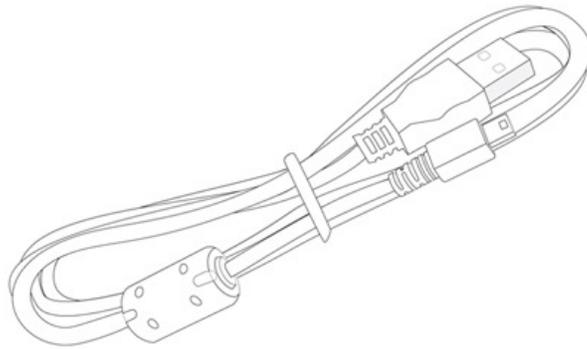


Accessories

The following accessories are included with your CM-5 Device.



AC Adapter Cord. The AC Adapter Cord provides power to the CM-5 device. The cord should not be left plugged in when the device is not in use, please unplug power from the device when not being used to test a subject.



USB mini Cord. The USB mini cord provided with your CM-5 device is to facilitate control of the device using a PC/Mac running the CM-5 App.

Getting Started

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WARNING: To avoid damage to the device, please read the entire guide before operating

Setting Up the Device

There are a few cables that must be plugged-in in order for the device to function.

USB Mini Cable

Make sure the USB cable is plugged into the body of the device and into a computer running the CM-5 App.



AC Adapter

Make sure that the AC adapter is plugged into the body of the device and a 110V AC power source. The AC Adapter should only be plugged in after the USB cable is plugged in. Unplug the AC Adapter when the device is not in use.



Finger Adjustment Knob

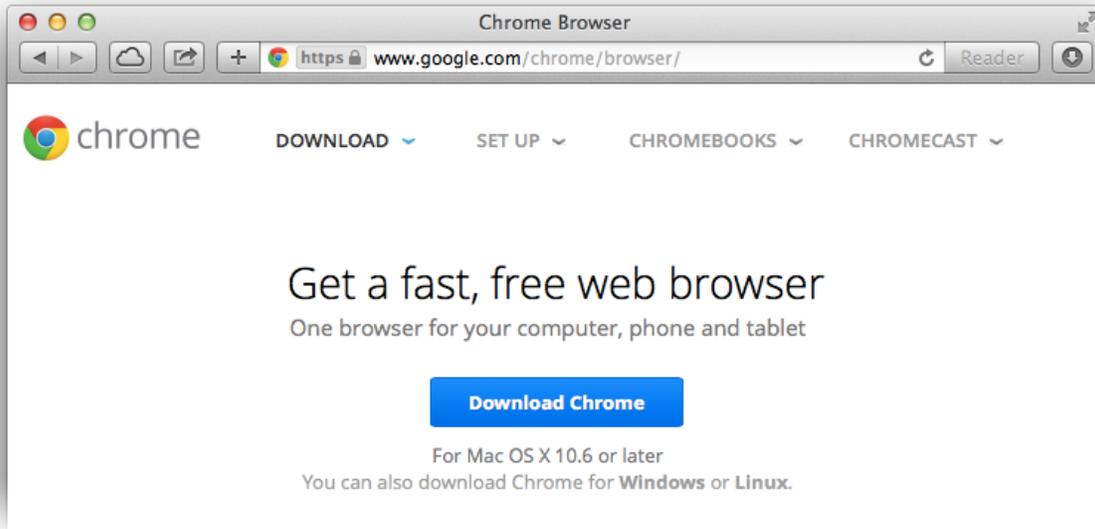
On the CM-5 there is a dial-like screw that can be unscrewed to allow personalization of the finger orientation on the stimulating tips. The screw must be tightened before testing begins.



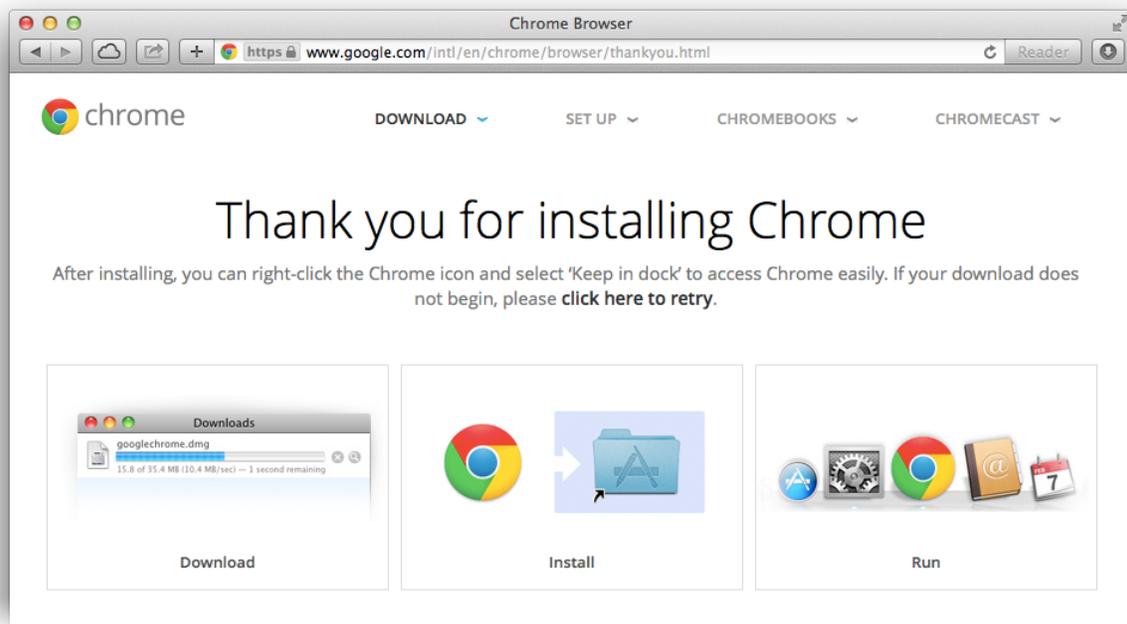
Installing the Google Chrome Web Browser

The CM-5 App is a packaged Chrome App, and can be installed on any PC running the Google Chrome web browser, which is easily installed on Windows, OSX, and Linux operating systems. It is strongly advised that you make Google Chrome your default web browser on the computer connected to your CM-5 device.

To install the Chrome Web Browser, browse to <http://www.google.com/chrome>

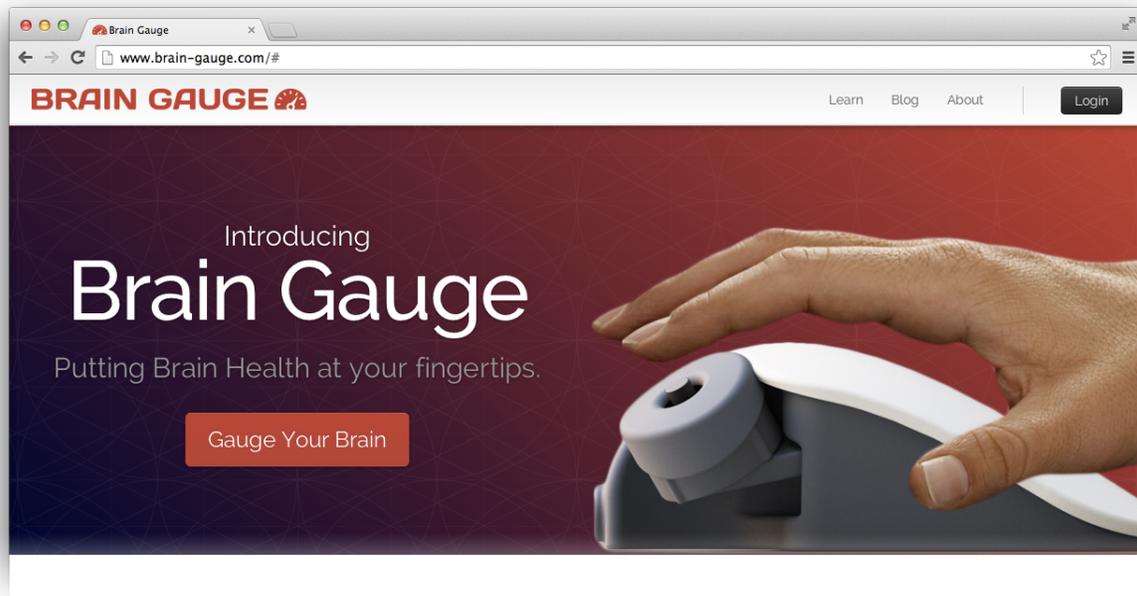


And follow the instructions provided.

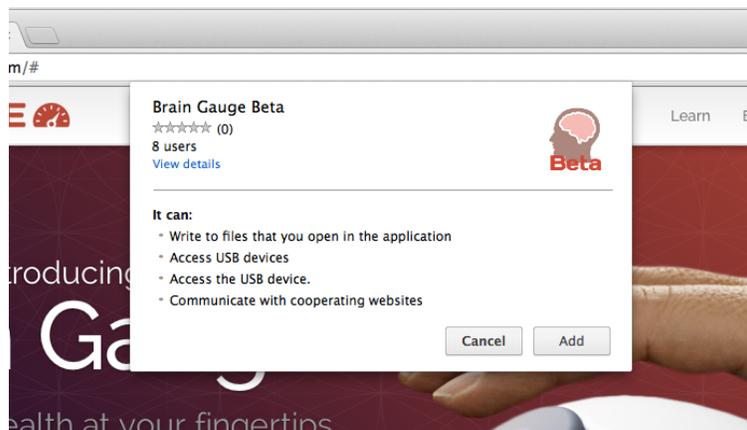


Installing the CM-5 App

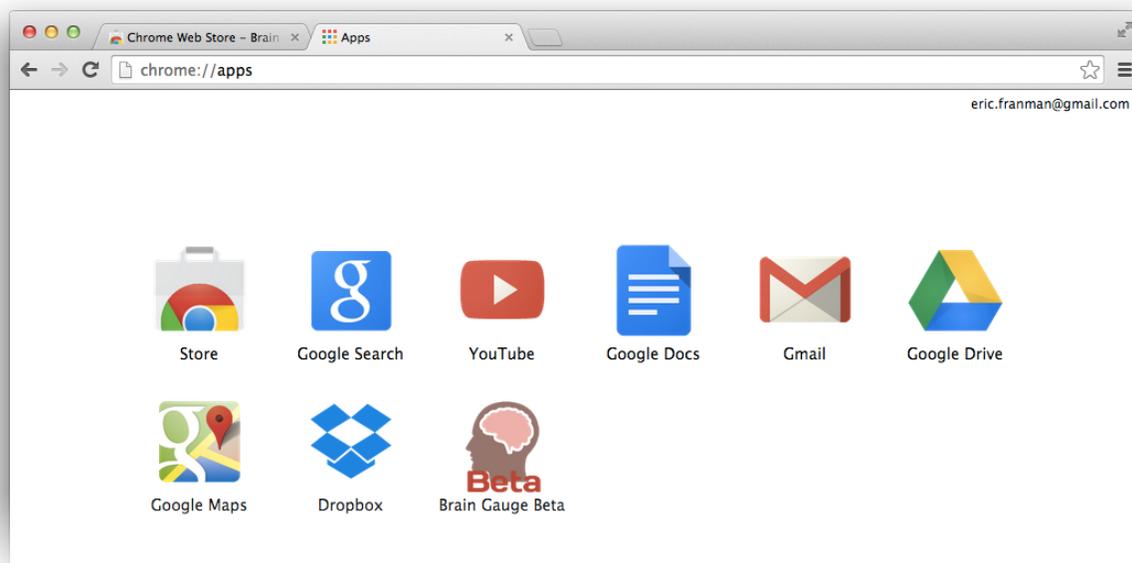
The CM-5 App can be installed by launching Google Chrome and browsing to www.brain-gauge.com and clicking the “Gauge Your Brain” button. (An error message will appear if you are not using the Chrome Web Browser)



A drop down permissions box will appear requesting that the CM-5 App be given access to the USB devices (to communicate with the USB device) and hard disk space for storage of the App and the accompanying database for data storage. The App will not be installed unless the “Add” box is clicked.



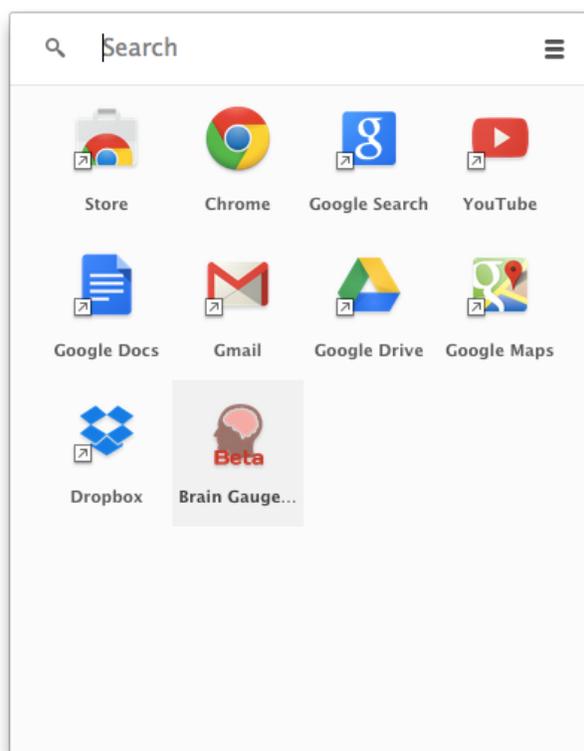
After installation of the CM-5 Chrome App, it can be accessed from multiple locations. It can always be accessed from the Apps section of Google Chrome which is accessible by clicking the Apps link in the top left corner or when opening a new tab.



If you have the Chrome App Launcher installed, it can obviously be found there as well

The CM-5 App can also be launched by browsing to brain-gauge.com in the Chrome Browser and clicking the "Gauge Your Brain" button.

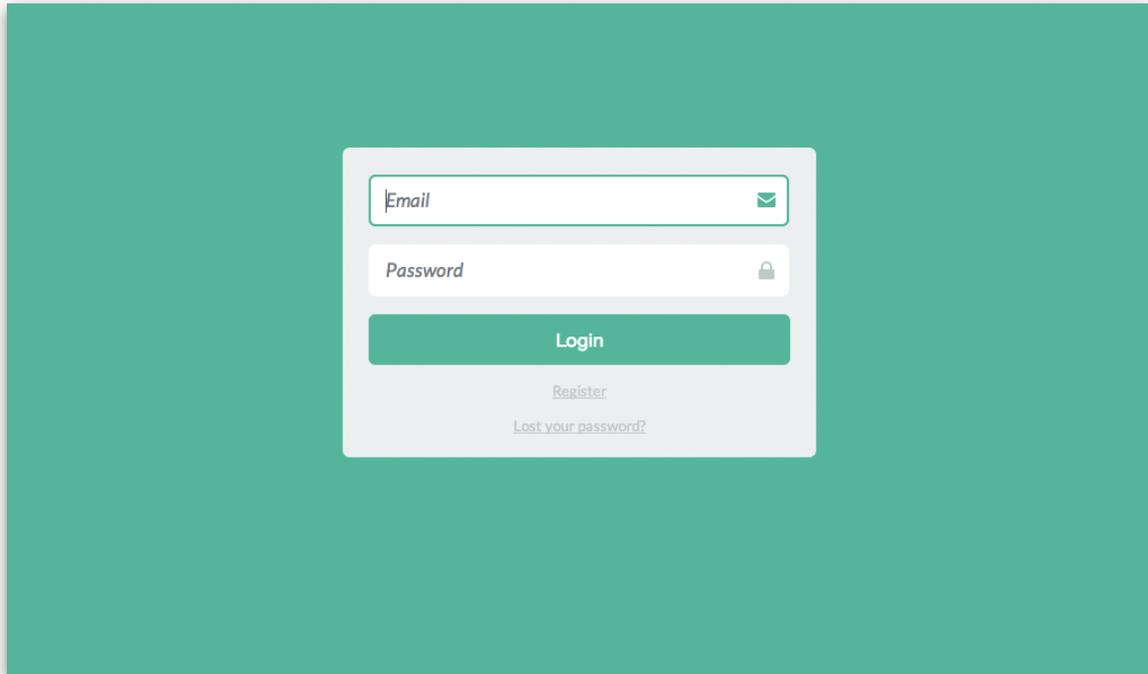
You will **NOT** be able to run/launch the CM-5 App without Google Chrome (version 31 or higher) installed.



Using the CM-5 App

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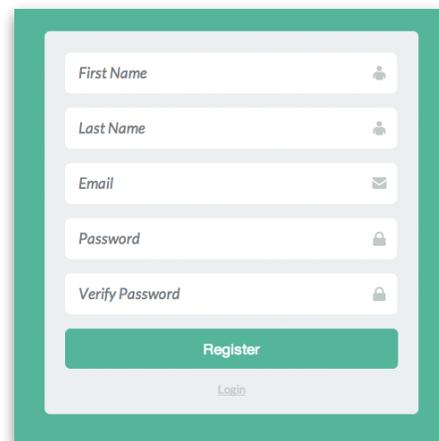
Logging In



When the CM-5 App is launched for the first time, you will need to enter your email and password. If you have never logged into CM-5 before, you may need to register for an account by clicking the register button below the Login button.

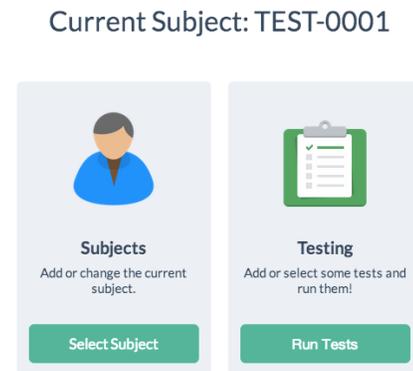
Registering for a New Account

Registration is free and open to anyone with a CM-5 Device. Enter your information into the required boxes and a confirmation email will be sent to you. Once the link in the confirmation email is clicked, you are registered for an account for use with all CM-5 products.



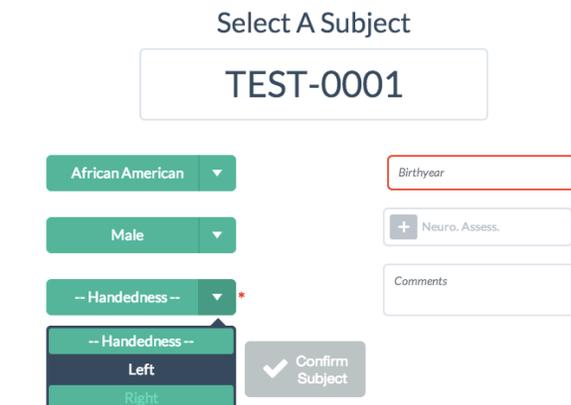
The Home Screen

Once your login information has been entered, you will be forwarded to the home screen. This will be the first screen you see each time you begin using the CM-5 App, and you will never again be asked to login. Two options are given: “Switch Subject” or “Run Tests.” If a subject is not assigned, then only the “Switch Subjects” button will be clickable and the “Run Tests” button will be disabled.



Switch Subjects

The Switch Subjects Panel is the hub for managing the identity of the subject taking the test. When a subject is using the CM-5 App for the first time, he/she will need to be assigned a subject number and enter that into the large text entry box. The demographics information underneath the subject information must be completed before the subject is stored into the database. Race, gender, handedness, and birth year are the only required

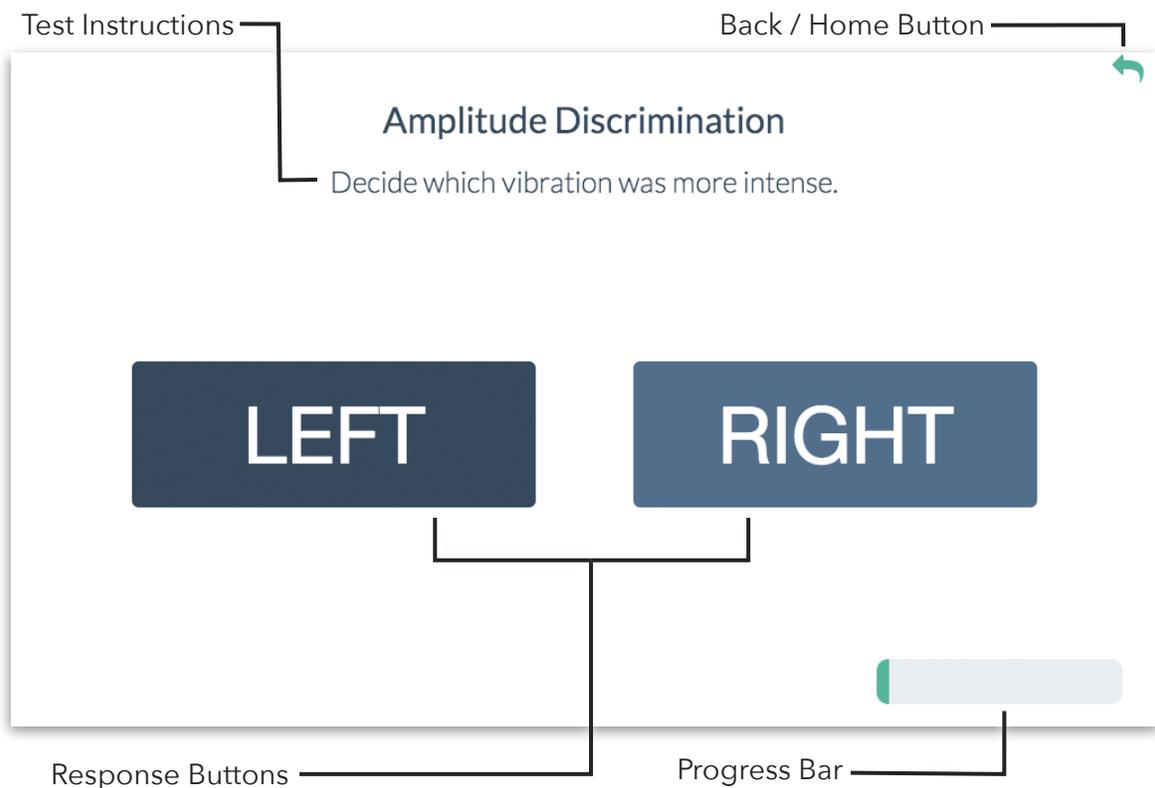


demographics. The Neurological Assessment and Comments box are used to record specific information important to the clinician on the day of testing. These boxes should be used to record any important information not included in the generic demographics.

Once a subject has been entered into the CM-5 App, their demographics will not have to be re-entered on subsequent testing sessions. Typing the subject number into the text box will bring up all the previously documented information, and assuming nothing has changed from their previous session, the subject can begin testing immediately.

Run Tests

Once the “Run Tests” button is clicked, the testing procedure will begin. The subject should be seated comfortably with their left hand placed on the CM-5 device, and their right hand placed on a 2-button mouse plugged into a computer running the CM-5 App. The subject should be able to complete the tasks by reading the instructions on the screen, if further instruction is necessary, explanations for each protocol are provided in the following sections of the guide.



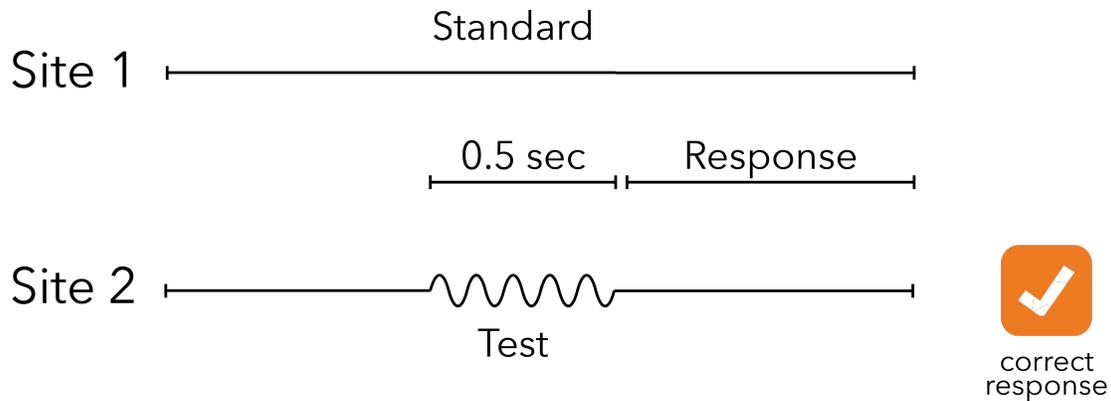
Each testing screen is laid out similarly. The name of the test is shown in Bold in the top center of the screen and the directions for completing it, are shown directly underneath. Left and Right buttons are provided when a choice must be made between two stimuli. A progress bar in the bottom right corner indicates how much of the test has been completed. If at any point the subject needs to skip a test or testing needs to be stopped, the arrow in the top-right will allow you to pause testing and choose any test from the current battery.

Threshold Protocols

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Static Threshold

Protocol



Concept

The subject will be asked to compare two “barely noticeable” vibrations. They will be delivered simultaneously to their left (index) and right (middle) fingers.

Directions

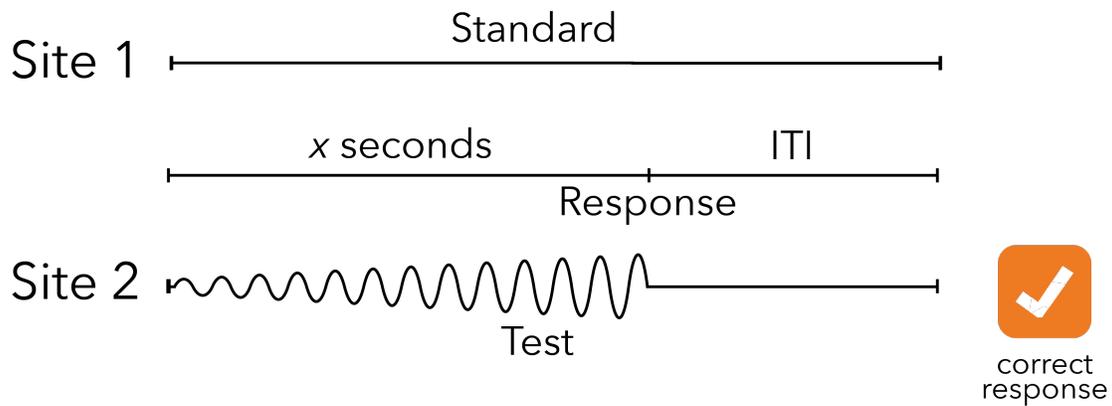
The subject should pick the “larger / stronger / more intense” vibration by clicking on the left or right button in the CM-5 App.

Testing Notes

Response time is not important, allow the subject to make the best choice possible. If they cannot feel the stimulus (or cannot tell a difference between the two) then tell them to make their best guess.

Dynamic Threshold

Protocol



Concept

The subject will feel one “barely noticeable” vibration. It is the subjects job to identify the finger with the “barely noticeable” vibrations

Directions

If they detect a vibration on their left (index) finger then the subject should click the LEFT button on the screen and if they think it is on their right (middle) finger then the subject should respond by clicking the RIGHT button on the screen.

Testing Notes

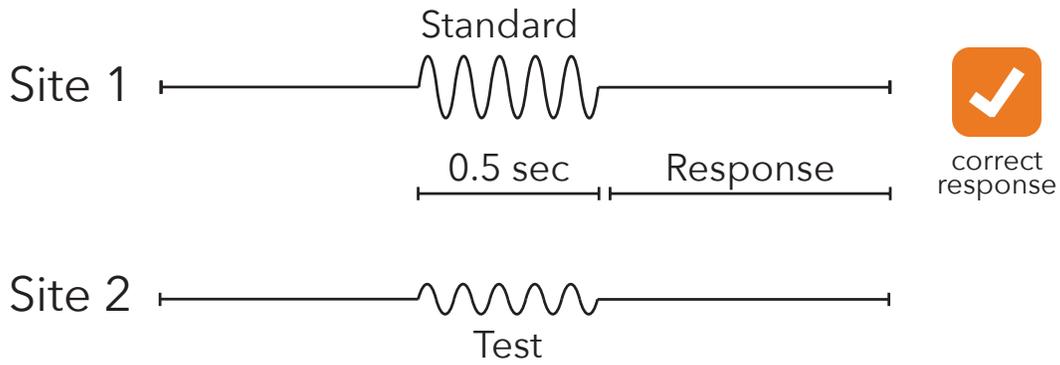
Make sure the subject responds as soon as they can detect the stronger vibration, response time is important.

Threshold Metrics

Performance on the threshold protocols are used to calculate the “sensitivity” score in the Big Brain database. These tests give insight into the subjects ability to perceive a “barely-noticeable” (or near-threshold) stimulus.

Amplitude Discrimination Protocols

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Amplitude Discrimination

Protocol

Concept

The subject will be asked to compare two vibrations. They will be delivered simultaneously to their left (index) and right (middle) fingers.

Directions

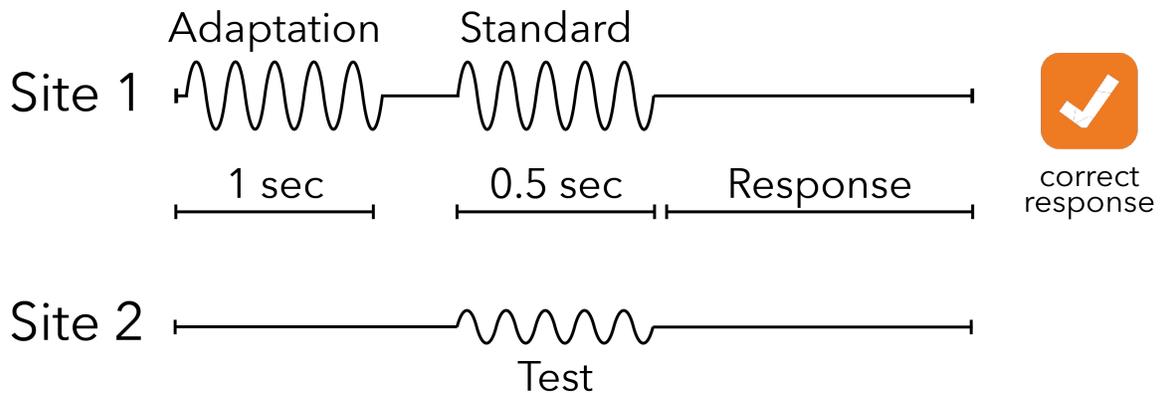
The subject should pick the “larger / stronger / more intense” vibration by clicking on the left or right button on the screen in the CM-5 App.

Testing Notes

Response time is not important, allow the subject to make the best choice possible. If they cannot tell a difference between the two then tell them to make their best guess. These stimuli are substantially stronger than the strength of the stimuli delivered in the threshold tests (20-30x as strong).

Single Site Adaptation

Protocol



Concept

The subject will feel a single vibration that they should ignore, followed by a pair of vibrations that they need to compare and report back with the "stronger/more intense" stimuli location (similar to amplitude discrimination)

Directions

The directions will remain the same as Amplitude Discrimination. However, the subject will be instructed to ignore a preliminary vibration that occurs before the test pair.

If the subject seems confused, or repeatedly misses the training trials, then just reinforce to "read the screen."

Testing Notes

Response time is not important, allow the subject to make the best choice possible. If they cannot tell a difference between the two then tell them to make their best guess.

Amplitude Discrimination Metrics

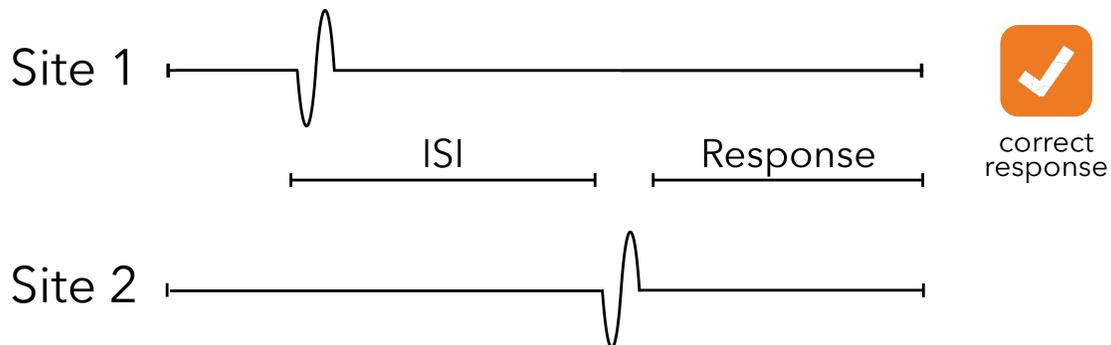
Performance on these amplitude discrimination protocols contribute to a subjects "Discrimination" score in the Big Brain database. The "Discrimination" measure refers to the subjects ability to compare two stimuli with and without the pretense of conditioning stimuli.

Temporal Order Judgment Protocols



Temporal Order Judgement (TOJ)

Protocol



Concept

The subject will receive two pulses - one to each finger - with one preceding the other. The subject is asked to indicate "Which one came first?" The subject should respond appropriately using the USB mouse to indicate LEFT or RIGHT on the screen of the computer.

Directions

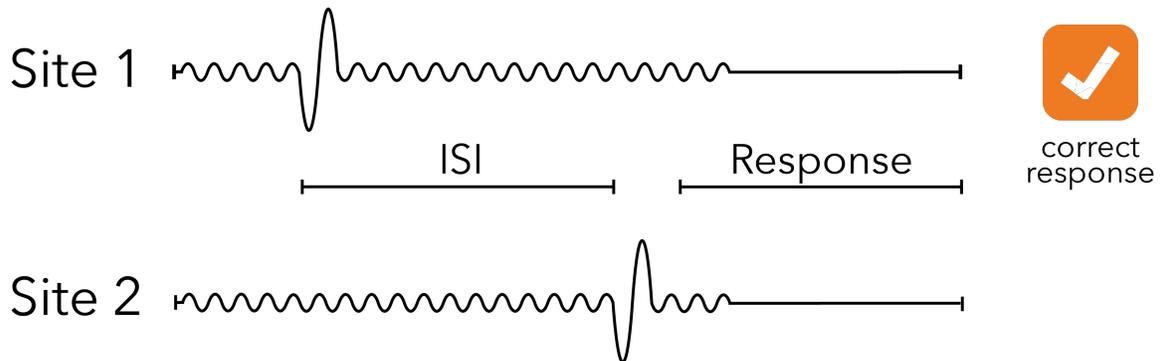
The subject should pick the "first stimuli" by selecting the right or left button on the screen of the computer. Some subjects find it easiest to remember the last stimulus and then choosing the opposite. The subjects strategy has no impact on the results.

Testing Notes

Response time is not important, allow the subject to make the best choice possible. If they cannot detect the location of the stimuli then tell them to make their best guess. Most subjects enjoy this test and find it easy.

Temporal Order Judgment with Carrier

Protocol



Concept

The subject will feel a slight “background vibration” overlapping with the two pulses. The subject is asked to ignore the background vibration and indicate “Which one came first?” and respond appropriately with the USB mouse.

Directions

The directions here should not differ from regular TOJ testing. The background vibration is so insignificant that most subjects easily ignore it without being given specific directions about it.

Testing Notes

Response time is not important, allow the subject to make the best choice possible. If they cannot detect the location of the stimuli then tell them to make their best guess. Most subjects enjoy this test and find it easy.

Temporal Order Judgement Metrics

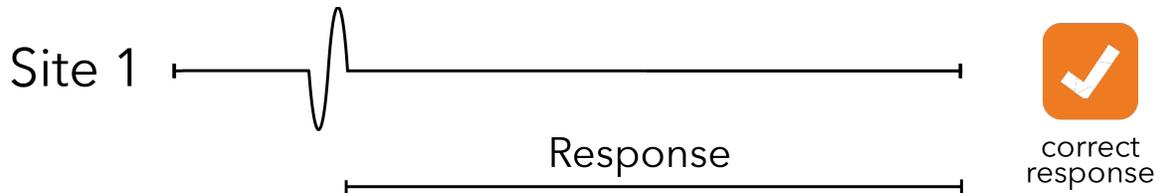
Performance on these temporal order judgement protocols contribute to a subjects “Timing” score in the Big Brain database. The “Timing” measure refers to the subjects ability to perceive two very quick stimuli with and without the pretense of conditioning stimulus.

Reaction Time Protocols

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Simple Reaction Time

Protocol



Concept

The subject will receive a single pulse to their middle finger. The only goal of the subject is to click the mouse button as soon as they feel the pulse. There is not an on-screen button to click, clicking anywhere on the screen will record their reaction time and progress the trial.

Directions

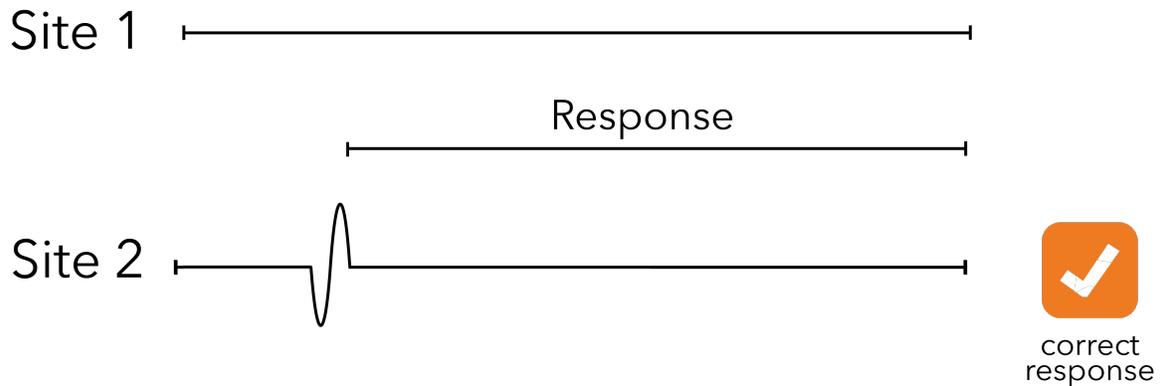
The subject should click as soon as they feel a pulse on their finger. Reinforce the importance of responding quickly, after all this test is measuring reaction time.

Testing Notes

If the subject does not feel the pulse, because they weren't prepared or took their finger off the device, then you may instruct them to just click and move on. The trial will naturally time out after 5 seconds, and move on to the next trial.

Choice Reaction Time

Protocol



Concept

The subject will receive a single pulse to either their index or middle finger. The subjects job is to indicate which digit they felt the pulse on as quickly as possible by clicking the LEFT or RIGHT button on the screen of the computer.

Directions

The subject should click the LEFT or RIGHT button as soon as they feel a pulse on their finger. Reinforce the importance of responding quickly, but remind them that it's their job to indicate the correct finger.

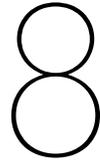
Testing Notes

Response time is important, but accuracy is equally important. If the subject does not feel the pulse, because they weren't prepared or took their finger off the device, then you may instruct them to just click and move on. The trial will naturally time out after 5 seconds, and move on to the next trial.

Reaction Time Metrics

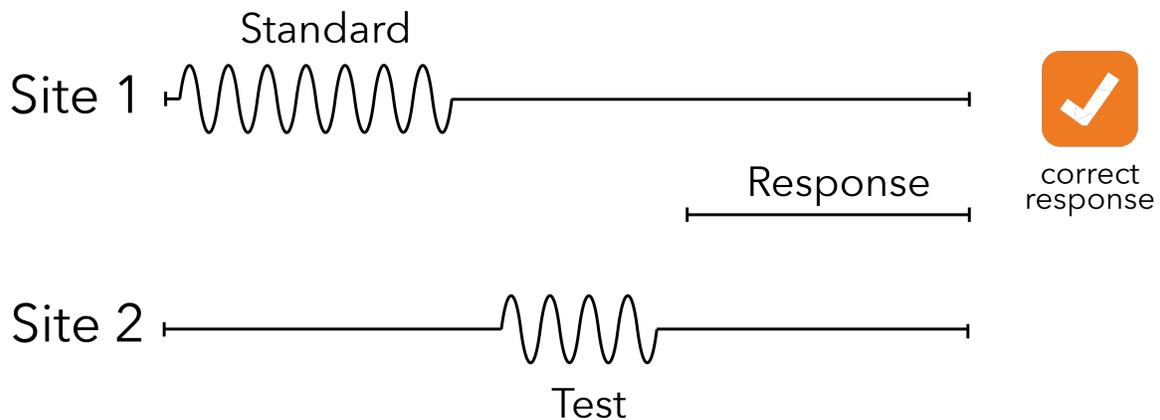
Both choice and simple reaction time contribute to the "Speed" score found on the Big Brain database. The "Speed" score is a holistic view of the subjects processing speed and response timing.

Duration Discrimination Protocols



Duration Discrimination

Protocol



Concept

The subject will receive two vibrations of different durations. One vibration is delivered to one digit, and after a brief pause the other is delivered to the adjacent digit. The subjects job is to indicate the longer duration stimuli.

Directions

The subject should pick the “longer” vibration by clicking on the left or right button on the screen in the CM-5 App.

Testing Notes

Response time is not important, allow the subject to make the best choice possible. Subjects regularly complain that the two stimuli feel they are of identical length, encourage the subjects to stay focused and take their best guess.

Contact Information

Feel free to contact our research lab with questions or concerns about your device and/or the Cortical Metrics software. Any problems with the software or device can usually be diagnosed and fixed with a quick phone call.

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