CMB 1.116 Mock MRI Scanner Facility

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Overview

The CMB 1.116 Mock MRI Scanner allows test subjects to practice with & get comfortable with a noisy & claustrophobic machine prior to spending money performing tests with a real MRI. The net result is less wiggling in the machine, which means less wasted money on failed tests. This simulator was built in 2015 by Moody College of Communication Technology Services for Dr. James Booth and is shared resource for use by researchers in Moody College of Communication. Researchers affiliated with the Moody College of Communication at the University of Texas at Austin who are interested in using the MRI simulator may request access via this form.

The MRI simulator can be simply described as a stage-prop version of an MRI (magnetic resonance imaging) machine which would be found in a hospital. It has a set of lights & speakers in an enclosure which looks like a real MRI machine. It has a 6' long motorized moving table, but otherwise, no moving parts. The machine requires no specific safety procedures since it doesn't actually contain any magnets, motors, nor sensors. Even though it is not technically dangerous, the manufacturer warns that "participants new to the MRI environment may become anxious or panic from the close confines of the enclosure in the Simulator. All efforts should be made by the researcher to quickly remove the participant, if such an event were to occur." Overall, the device is about 12' long, 7' tall and 4-6' wide (depending on how hinged side wings are set up). The MRI simulator plugs into a household electrical outlet and features a single 3.5mm miniplug audio input for its internal speakers. There is no volume control provided within the machine - playback volume is controlled upstream via an external volume control. A simple control panel drives the light, fan & table movement. A small wireless remote allows a test subject to move themselves in & out of the machine (which is a handy way for researchers to test their experiments when they are working alone in the lab).

Additional photos of the facility are available in this gallery.

General Use Summary

The test subject will lay down on motorized table.

The test subject will wear a pair of headphones/earbuds to present audio stimulii.

A head cage will be installed over their face/head and they will be motored into MRI machine via the moving table.

The test subject will have a 2-button USB mouse in their hand for A/B response to presented tests.

The head cage features a wide angle camera which allows researcher to observe the subject's face via monitor on the researcher's desk. The researcher is watching for squirming/movement and will advise the test subject if they are moving too much. For this reason, researchers would prefer their desk to be nearby the MRI machine rather than in a separate room. The key to these tests is that the test subject must remain absolutely still – often for 30 minutes or longer. Especially with younger children, this is very challenging.

The head cage features a periscope/style mirror which allows the subject to look out of the MRI machine at a computer monitor above their head. Since the subject is looking via a mirror, the signal must be electronically flipped so that text appears correctly oriented.

The researcher will begin the session by triggering a series of audio recordings of an actual MRI machine in use, which are played by the MRI simulator's internal speakers & subwoofer. These sounds are heard acoustically in the room as opposed to the stimuli presented via the subject's headphones. The sounds will be played from Adobe Audition allowing multitrack control of several simultaneous sound effects or iTunes allowing playback of 1 sound effect at a time. These sound effects will out played out of an USB sound card on channels 3 & 4, which route to the simulator's speakers. Alternately, these sound effects could be played from an MP3 player (not included in this project scope).

The test subject will be shown a movie for a few minutes to allow them to relax. They watch the movie by looking into the periscope mirror at a monitor mounted outside the machine on the wall above the test subject's head. This movie is a quicktime or similar video file played on the PC. The movie could be played manually using VLC or quicktime player or can be triggered and presented programatically by an E-Prime test. Sound from this movie will be played out of an USB sound card on channels 1 & 2, which route to the test subject's headphones.

After the subject has had a few minutes to watch the movie and relax, the researcher will proceed with the experiments. Typical experiments might include E-Prime presenting visual stimulii (such as illustrations, photos or text via the periscope monitor), triggering various MRI noises & sounds via the simulator's speakers, and presenting audio stimulii via the subject's headphones (such as spoken words, tones, or music). The test subject will respond to the tests by using the USB mouse buttons to responsd A/B. The test subject's responses will be recorded by the E-Prime software, but remember that this isn't the real test – it is simply practice allowing the test subject to get comfortable with the noise, confined space, being VERY still and taking the test which they will be taking later in a real MRI machine.

In the real MRI machine test, the researcher is magnetically scanning the subject's brain while these particular stimulii are presented and the subject is recording their responses with the USB mouse. Accordingly, the researchers work to observe and find statistically significant correlations between the measured activities in the brain and the visual & aural stimulii. The recordings from the real MRI machines are datasets of multiple gigabytes and a large research study could easily require multiple terabytes of storage space.

The use of a real MRI is expensive and wiggling/movement will ruin the test. The simulator is valuable because is is cheap. A test subject can practice multiple times and become comfortable with the entire process before time & funds are committed to an actual test. Researchers only see about at 20-30% success rate with test subjects who go straight to the expensive MRI. However, if the test subject is allowed to practice a few times, success rates of 80+% are typical.

Useful Bookmarks

- **USHER Reservations**
  - CMB1.116 MRI Simulator
  - CMB1.118 Experimental Lab3

Reviewed 10/2/17 - Cox