

UCLA Semel Institute

Consortium for Neuropsychiatric Phenomics

CNP LA5C: Scanning Manual

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General Considerations for Testing

Physical Conditions for Testing

- The physical setting can affect the participant's performance. Potential distractions or interruptions should be minimized. Conduct the testing in a room that has good ventilation and good lighting and that is free from distractions and outside interruptions. As a rule, no one other than you and the participant should be in the room during the testing.
- Seating arrangements are important for efficient test administration. The furniture should be comfortable and appropriately sized for the participant. The height of the desk or table should allow the participant to work comfortably.
- Ideally, you should sit opposite to the participant so that you can fully observe the participant's test-taking behavior. Make sure you can easily reach and handle all administration of demos on the laptop.
- The materials not being used should be out of the participant's sight but within your easy reach. It is suggested that you use a clipboard for the any forms, which should never be readable to the participant. However, you should avoid any self-conscious efforts to conceal the materials, because such behavior may make the participant apprehensive or suspicious.

Dress Code

- Professional attire and behavior is required for all scan sessions.

Establishing and Maintaining Rapport

- A cooperative relationship between the participant and examiner is essential to all assessment situations. As in all social interactions, an accepting, non-threatening tone promotes rapport.
- Administration of the task should be presented in a professional but unhurried manner. To sustain rapport throughout the test, convey your sincere enthusiasm and interest in what the participant is doing. Do not, however, give feedback on whether a particular response is right or wrong. Instead, reinforce the participant for responding—except for performance in the demos where participants need to understand the task instructions and perform accurately as possible.
- Participants will differ in the amount of explanation that they need before testing begins. Use your judgment to decide if elaboration is needed.
- Do not deceive the participant about the purpose of testing. Always be truthful and honest.
- Watch the participant vigilantly throughout all tasks. At this stage, it is very important that the participant understand each of the tasks to be performed in the scanner before going to the scanner.

Overall Human Participant Testing Considerations

Breaks:

- The LA5C portion requires that we follow the schedule closely, as we must be on time for the scan session, and must be finished by the end of our allotted scan time.
- However, do not rush the participant or make them feel time pressure.
- You can allow them small breaks during pre-testing if needed.

Suicide Risk:

- Given the large number of individuals who will be participating in this study, the possibility exists that a given individual might report suicidal ideation at some point. One of our main goals is to ensure the safety of the study participants and the HTAC staff. Along those lines, each HTAC examiner needs to know his or her level of training and expertise in assessing suicidal ideation. If you have little or no clinical training, or training in evaluating risk for suicide, and a study participant shares suicidal ideation of any type, be sure to find a member of HTAC immediately who can assist you in assessing suicide risk.
- Members of our HTAC team who have clinical training in assessing suicide risk should conduct an assessment of a subject to determine the level of treatment. Please refer to the HTAC manual for the risk factors associated with suicidal behavior. One important determinant is the verbalization of specific plan and access to the means to carry out the plan.
- No matter what your prior level of training, finding the appropriate HTAC staff person to assist you in the evaluation of a subject who reports suicidal behavior is a step-by-step process. The first step is to find your immediate supervisor, e.g. Dr. Bilder or Dr. Ventura. Then, either Drs. Bilder or Ventura will make an evaluation and determination about whether an emergency exists.
- Dr. Bilder can determine whether the individual requires a voluntary or involuntary hospitalization.

Before the Scan Session

Keep in Mind

- Scanners are responsible for making sure that the simulator or testing room are reserved and the scan is scheduled.
- Find out the scheduled participant's "Participant ID #" [and counterbalancing information] before the day of the scan.
- Have the laptop, necessary forms, and payment with you before the session.
- Arrive early to meet the participant.
- ***DO NOT download any programs onto the laptop. The laptop is solely for the purpose of testing participants. It should never be used for anything other than running experiments.
- Back up data regularly.

Guidelines for Scheduling Scans

The MRI portion of the study consists of two sessions. Each session consists of ~1 hour of pre-scan training, and 1 hour for the scan itself. The two sessions **MUST** be scheduled on different days, and both scan sessions **MUST** take place within 2 months of completion of the LA2K testing.

-Tip for scheduling scans: if possible, it's best to choose a time that has open spaces before and/or after the scan, just in case things run late or we have technical difficulties. If that's not possible, though, any time is fine.

-Patients should only be scheduled for sessions between 10:00 and 4:00 MWF and 10:00-7:00 Tues/Thurs, so that appropriate people will be available in case of an emergency. Controls can be scheduled whenever the scanner is available, including nights or weekends (within reason)

When subjects are being scheduled, you should make sure they don't have any of the following:

- Braces/permanent retainers (normal fillings are okay)
- Surgical implants
- Irremovable piercings
- Eyelid springs/wires
- Tattoos anywhere on the head (eyeliner, mascara, scalp, etc)
- Massive or full body tattoos
- Pregnancy
- IUD birth control device

If the subject has any of those, it is not an automatic exclusion, it just means we need to research it and get approval before they can be scanned (aside from braces/permanent retainers/pregnancies; those will always be bad). If the subject mentions having one of them, get as much information about it as you can. For things that were done medically, try to get contact information for the doctor or hospital. Pass whatever information you have, along with the patient's contact information, on to Angelica (abato@mednet.ucla.edu). Let the subject know that we will re-contact them once we know whether or not they can be scanned.

Tattoos that are not located on the head and are not covering their entire body, are generally fine to scan with. However, there is a possibility, depending on the ink that was used, that the area with the tattoo would begin to heat up during the scan. Potential participants with tattoos should be informed that this risk exists, and in the event that

their tattoo area has unusual sensations during the scan they can inform us and we will terminate it immediately (the heating up is a gradual process, so as long as they let us know immediately there should be little to no risk). The more “reputable” the place they got the tattoo, the less likely it will be a problem (so prison tattoos are very unsafe, but a tattoo shop in the United States is probably OK).

Other things to screen subjects for:

- The subject must be right-handed
- The subject must be able to tolerate the conditions of the scan (ie, ask them if they’ll be able to handle laying in an enclosed space for an hour).
- Subjects must be no more than 400 lbs, and 60 cm across. Subjects who are especially “wide” may have trouble fitting into the scanner comfortably. If you have any doubt, please ask someone who is familiar with the scanner BEFORE scheduling the scans. At the very least, larger subjects need to be informed that the scanner will feel especially cramped for them (NOTE: a scan should be attempted on all patients over 400 lbs. These guidelines apply to controls)

These are the rules for medications within each subject group (caffeine and cigarettes are OK):

- Controls: no psychoactive medication whatsoever
- Schizophrenic: stable psychoactive medications allowed
- Bipolar: stable psychoactive medications allowed
- ADHD: no psychoactive medication whatsoever, and they cannot have been medicated for ADHD within 12 months prior to the scan

No subjects, including patients, should ever take anti-anxiety medications before the scans, such as benzodiazepines. Stable anti-anxiety medications, such as SSRIs, are okay for the Schizophrenic and Bipolar patients. As a general rule, tell patients in those two groups that they can only take medication that is part of their normal regimen.

Other things to note:

- All subjects should receive a call or email reminder 1-2 days before the scan. This is extremely important, because they tend to forget otherwise.

-It is absolutely vital that subjects show up to these sessions on time. Please stress to them that if they show up late for their appointment we may have to cancel it, because we can only use the scanner at specific times

-In the event the subject has to cancel, let them know that the sooner they tell us the better. If we can cancel the day before, we aren't charged for the scan, but if we cancel the same day there is a substantial cancellation fee. If we do not cancel by the time the scan was supposed to start, we have to pay for the entire scan. If a subject tends to be chronically late, we can schedule them earlier than the time we actually want them, and just pay them extra if they do show up on time (don't tell the subject this obviously though, and use your discretion as to when this would be necessary)

-Because this is an MRI, we'll ask subjects to empty their pockets and take off any jewelry and belts before we begin. We'll store it in a locked location, but they shouldn't bring anything that they wouldn't be comfortable taking off during the scan.

-If they normally wear glasses, it is easiest for us if they wear contacts the day of the scan if possible, since they can't wear glasses during the scan. If not, it's totally fine, we have lenses for them, but it's better if they can use their own.

Reminders to Send Before Scan Day

Remind participants of the following before the day of the scan:

You will be undergoing an fMRI scan at this scheduled time so it is important that you follow these instructions:

- Please wear as little metal on your person as possible. Don't wear hair clips or pins.
- Do **not** wear colored contact lenses. Regular lenses are OK—but not colored contact lenses.
- If you wear glasses, it would be helpful to know your prescription so that you can be fitted with MRI-compatible glasses.
- Remove all piercings before coming to your session.
- All dentures, false teeth, partial dental plates, hearing aids, wigs, or hairpieces must be removed before scanning.
- You cannot be scanned if you are pregnant or suspect that you may be pregnant.

You can store your personal belongings in a lock box or with the experimenter during the scan, because you cannot take anything with you into the scanner.

Please remember that you will be participating in an experiment then, so we hope that you can arrive on time and with enough energy to do what is asked of you. Also, please note that because of the limited availability of sessions, it is *especially* important that you commit to showing up for your session. Please let us know ahead of time if you need to cancel your session.

Scan Day: Pre-Testing Process

Total Estimated Time: 30 minutes

Examiner's Preparation Checklist for Pre-Testing

NOTE: To be performed at least 30 min prior to scheduled session.

Completed	Task
<input type="checkbox"/>	Confirm testing schedule with calendar (behavioral room and scan session).
<input type="checkbox"/>	Simulator is reserved.
<input type="checkbox"/>	Scan session is reserved.
<input type="checkbox"/>	Retrieve the "Participant ID #" (database).
<input type="checkbox"/>	Make sure all lights are fully turned on in the testing room.
<input type="checkbox"/>	Check thermostat to make sure the temperature is between 69-72 degrees F (if possible).
<input type="checkbox"/>	Silence your phone.
<input type="checkbox"/>	Place the metal screening form and pen on the desk.
<input type="checkbox"/>	Turn on the laptop; plug in the power cord; open Matlab and go to the appropriate directory for task demos.

Participant ID

- This can be found at LA5C database: <https://www.npistat.org/htac>
 - IDs will be provided by SI-STAT.
 - Counterbalancing information will be provided by SI-STAT.

Appointment Slip

- This can be done through: <https://www.npistat.org/htac>
All of this is Pending...
- Log in using your username and password.
- Click on “LA5C Scheduling Calendar” in the top row of the database.
- Scroll down to the bottom of the page and choose a subject ID # from the drop down menu.
- Choose an available tester from the drop down menu.
- Choose an available testing room from the drop down menu.
- Select a date and time from the drop down menu.
- Click the circle “Do not repeat” since this session will not be repeated.
- Write any notes if necessary.

Scheduling Session

- Schedule session with participant
- Schedule scan
- Reserve Simulator room

Note:

- Participants should complete both of their scans within 2 months of finishing the LA2K component.

Pre-Testing Session

General Directions:

- Meet and welcome the participant in the LA2K space and walk them to the room where pre-testing will occur.
- Upon greeting potential participants, ask about the subject's day, any difficulties finding the CNP study office, or make other appropriate light conversation while the appointment is beginning.
- Make an attempt to be hospitable by offering the subject a drink of water or snacks that are available in the CNP reception area.
- Thank the person for his/her interest in the LA5C study and willingness to consider participation.
- Lead the participant to the assigned testing room.
- In the first 3-5 minutes get to know basic aspects about the participant, e.g., school or work status, while establishing rapport.
- Clarify cell phone policy for participants with cell phones.
 - a.) Tell participants that we are using very sensitive equipment in our sessions and we need all cell phones turned off.
 - b.) We'll also let them know that there will be opportunities to check their cell phone for messages during breaks between tests.
 - c.) If the participant says no to this, ask them to put their phone on silent mode/vibrate. Record any disturbances that occur.
- Then provide a general overview of the scan session, starting with the pre-testing session, preparations before the scan session, and then the scan session. Say,

Today we are going to have an approximately 2-hour session. We'll start by going over the tasks that we are going to be asking you to complete while in the scanner. We'll also go over what to expect during the scan session, before we prepare for it. We'll then walk over to the Brain Mapping Center where we will have the scan.

Do you have any questions?

- Run a participant on the demos as many times as needed in order to ensure that they understand the task and are ready to perform it in the scanner.
- Have the list of FAQ's on hand [see page 230 of this manual] to use as a guide for responding to the participant's questions.

Materials:

Laptop with audio turned on

Number pad

Demo pictures

Set Up:

Getting Started:

- Have the participant sit in the chair in front of the testing computer station.

Running Task/Demos:

- Begin each task listed on the participant's counterbalance log—All Matlab demo files should be in the task directory
- Enter in the participant's ID #.
- Session # should **always** be 1 unless you have to re-start/re-run a task. It does **not** denote the visit number.
- Make sure to read the instructions on the screen aloud to the participant. **READ ALL INSTRUCTIONS VERBATIM**. Show them the demo pictures as you are reading the instructions. Then, if there are additional questions, you can elaborate.
- Remember to monitor the participant to ensure they are responding correctly using the proper fingers, are alert, and in the correct position (i.e., that they are not leaning too close to the screen).
- Make sure to ask participants after each demo if they remember what the task requirements are, and if they have any questions. It is crucial that they understand the tasks before going into the scanner. Re-run the demo as needed to ensure that they understand the task
- Run through each of the following in the order according to Counterbalance Log
- After running through each of the demos, remind the participant that they will be performing complete versions of these tasks while in the scanner, in a different order. Also tell them about the Resting scan.

DEMO: Balloon Analog Risk Task (BART)

Description: The BART is a computer task that serves as a behavioral index of basic risk decision-making. Lejuez et al. (2003, 2002) reported favorable convergent and discriminant properties of the BART, indicating convergence with other indices of risk-taking (e.g., gambling), and divergence from impulsivity and anxiety-relevant variables such as anxiety sensitivity. In the BART, participants accumulate rewards by blowing up virtual balloons (by pressing one key) or stop pumping (by pressing another key). There are two colors of balloons: green and white. For green balloons, each pump results in an accumulation of 5 points. Each balloon has an explosion threshold that varies from balloon to balloon and which, if reached, results in the loss of all points for that balloon. Therefore, in deciding whether to make each pump, participants weigh the potential gain against the potential risk of losing all money for that balloon. For white balloons, participants do not earn points for pumping up the balloon, but are instructed to pump up the white balloon until it ends. BART performance provides a more valid and generalizable assessment of risk decision-making than many other standard risk-taking tasks (Lejuez et al., 2002). The average number of pumps per unexploded balloon serves as the primary dependent variable.

BART Demo Details

For the demo version, participants have one minute to blow up to 5 virtual balloons (by pressing n) or stop pumping (by pressing m). Each pump of a green balloon results in an accumulation of 5 points. The outcome of these balloons depends on how the participant responds.

For both the green (experimental) and white (control) balloons, the balloon disappears once the participant responds (either pump or quit). The timing is set so that the duration between balloons is variable ($1 + \text{rand}(2)$). The duration of the feedback screen (whether it is running total with a green balloon, exploded green balloon, or running total with a white balloon) is always 2 sec. The intertrial interval is variable (although the mean ITI = 4 sec, the min ITI = 1 sec, and the max ITI = 12 sec).

Directions for Administration and Scoring:

Materials:

Laptop

Number Pad

Pump = blue button; Stop = yellow button (or Pump = n key; Stop = m key if using keyboard)

Estimated Time:

1 minute

General Directions:

If you are using the button box:

- Go into the BART directory in Matlab and start the BART_CNP_demo m-file.
- Which device for participant responses? Choose the number corresponding to “Keyboard, USB Compliant Keypad”

If you are not using the button box:

- Go into the BART directory in Matlab and start the BART_CNP_demo_keyboard m-file.

Place the demo picture in front of the participant.

Read instructions verbatim to participant. Say,

We’re going to do a couple trials of the balloon task. In the following game, your goal is to earn as many points as possible. You will see a balloon appear on the screen. Every time you press the key you will pump up the balloon and earn more points. Sometimes the balloon will explode and you will not receive the points earned on that balloon.

You will see either green or white balloons. For green balloons, you can get 5 points for each pump! However, when the balloon explodes, you get no points. You can save your points by choosing to stop pumping before the balloon explodes. For white balloons, you won’t earn points, so just pump up the white balloons until they go away.

There are a set number of trials in this experiment, so maximize your points on each trial. To pump up the balloon, press the first button. To stop inflating the balloon before it explodes, press the second button.

[After reading instructions, it helps to explain subjects that there are two main differences between this task and the one he/she did previously. The first is that in the MRI version of the task, the white balloons do not give any points, and therefore cannot be cashed out early with the second button. The second is that because this version of the task is designed for functional MRI analysis, it goes MUCH slower than before. Let the subject know that when they push the button, the balloon will disappear off the screen for a second, and then come back slightly bigger, and they only need to push the button when the balloon is on the screen. Otherwise, they sometimes will spam the button, which isn't ideal.]

Also, this demo has a few quirks you should be aware of: unlike the other demos, this one starts right away once you get it going in matlab, so make sure to read the instructions first and warn participants that it will start right away; and secondly, the order of the balloons is completely random, so sometimes you will see all white balloons or all green balloons. If the subject hasn't seen both types of balloons by the time the demo has finished, you should rerun the demo. Also, this demo will bring up a gray screen when it finishes. Just push a key on the keyboard to clear the screen.]

NOTE: If not using the number pad, have the subjects respond with 'n' and 'm' for left and right

There are no on-screen instructions.

- Start the demo and watch that the participant is responding correctly.
- Watch to make sure that the participant sees both white and green balloons; if not, re-run the demo.
- When the demo is complete, press any key to end the program.
- When the demo is completed, ask the participant if they have any questions and ensure that they understand the task before proceeding to the next demo.

DEMO: Breath Holding

Description: Subjects are asked to alternate between holding their breath and breathing regularly while resting

BH Demo Details

For the demo, participants will complete 2 cycles.

Directions for Administration and Scoring:

Materials:

Laptop

Estimated Time:

1 minute 6 seconds

General Directions:

- Go into the BHT directory in Matlab and start the BHT_demo m-file.
- You do not need to enter an ID.
- Choose a device for participant responses? Enter the number corresponding to “Keyboard, USB Compliant Keypad” for number pad (or 4 for keyboard)
- Confirm that all information was input correctly.

Place the demo picture in front of the participant.

- Read the instruction verbatim to the participant. Say,

During this task we will periodically ask you to hold your breath for 13.5 seconds at a time. After each breath hold, you will be given a rest period to breathe normally. For the practice, this will go on for 2 cycles, so you will need to hold your breath 2 separate times. During the scan, you will need to hold your breath 5 times.

The task starts out with 13.5 sec of normal breathing. During these periods of regular breathing, you will see a green bar on the screen. When it's almost time to hold your breath, you will see a yellow bar. A blue line will travel upwards. As it moves, you

should take a breath and prepare to hold it. When the blue line reaches the top, the bar will turn red and you should start holding your breath. During the entire time that the bar is red, you should not breathe (in or out). After 13.5 seconds, the bar will turn green, and you can start breathing normally again.

When you take in a breath and hold it, please make sure that you do not move your chest and shoulders. You can avoid this by breathing in gently.

[Subjects are sometimes confused by why they need to breathe in gently, so you can explain to them that it is because we want them to keep their head still the entire time that is in the scanner (and if they're breathing wildly, they might accidentally move it). Also, subjects are sometimes think this task is a little wacky, so if they ask about why we make them do this, you can just explain that we want to see what their brain is doing while they hold their breath.]

What the participants see on the screen:

When the bar is GREEN, breathe normally.

When the bar is YELLOW and the blue line is moving upwards, take a deep breath and prepare to hold it.

When the bar is RED, hold your breath and do not breathe until the bar is green again.

- Start the demo and watch that the participant is responding correctly.
- When the demo is completed, ask the participant if they have any questions and ensure that they understand the task before proceeding to the next demo.

DEMO: Paired Associates Memory Task (PAMenc & PAMret)

Description: This experiment consists of two parts. Part 1 consists of pairs of words with corresponding pictures. One picture is in orange while the other is in black and white. The participant is asked to press the first button if the orange image is on the left, and the second button if the orange image is on the right. Participants are also asked to remember the words pairs as best they can. For control trials, participants see pairs of squares, one in orange and the other in black and white; words are not shown. Subjects must press the first button if the orange square is on the left, and the second button if the orange square was on the right.

Part 2 of the experiment shows pairs of words and participants must recall if the words were paired in the first part of the task. To reflect certainty of his/her answer, the participant must use four different response options: sure correct, maybe correct, maybe incorrect, and sure incorrect. For control trials, subjects see the words “sure correct,” “maybe correct,” “maybe incorrect,” and “sure incorrect” on the screen. Subjects are to press the corresponding button to the response option.

PAM Demo Details

In the PAMenc demo, subjects will see a few trials, both with pairs of words as well as controls trials. In the PAMret demo, subjects will be shown several trials, showing both pairs of words as well as control trials.

Directions for Administration and Scoring:

Materials:

Laptop

Number pad

Left = blue button; Right – yellow button (or, if using keyboard, Left = n key; Right - m key)

All buttons: blue - sure correct (1), yellow – maybe correct (2), green – maybe incorrect (3) and red – sure incorrect (4)

Estimated Time:

General notes on this demo:

- This task has 2 m-files (PAMenc and PAMret) and they should always be run in that order

PAMenc Instructions:

- Go into the PAMenc_fixed directory in Matlab and start the PAMencdemo m-file.
- Choose a device for subject responses? Enter the number corresponding to “Keyboard, USB Compliant Keypad” for number pad (or 4 for keyboard)
- Choose a device for experimenter responses? Enter the number corresponding to “Keyboard, USB Compliant Keypad” for number pad (or 4 for keyboard)
- Confirm that all information was input correctly.

Place the demo picture in front of the participant.

- Read the instruction verbatim to the participant. Say,

This experiment consists of two parts. In Part 1, you will see a set of word pairs and their corresponding pictures. One picture is presented in orange, while the other is in black-and-white. Please press the first button when the orange image is on the left, and press the second when the orange image is on the right.

In addition to pressing the button, your task is to memorize the word pairs by trying to form meaningful relationships between them. For example, you could make a story about the two words, or think about how the two words could go together in real life. In part 2, you will be asked to judge how sure you are the words were shown together.

Also, on some trials, pairs of orange and black-and-white squares are presented. On these trials, just press the first button if the orange square is on the left, and the second button if the orange square is on the right.

[People get very confused about this task, probably because it sounds so simple. So before you start the demo, you should make sure that they explicitly understand what they are supposed to do.]

What participants see on the screen:

You will see two words and two pictures on the screen. One picture is presented in color.

Press the FIRST button if the colored image is on the left.

Press the SECOND button if the colored image is on the right.

Your task is to memorize the word pairs by trying to form meaningful relationships between them.

Try to remember the word pairs as best you can, as you will be tested on them soon.

- Start the demo and watch that the participant is responding correctly.

PAMret Instructions:

- Go into the PAMret_fixed directory in Matlab and start the PAMretdemo m-file.
- Choose a device for subject responses? Enter the number corresponding to “Keyboard, USB Compliant Keypad” for number pad (or 4 for keyboard)
- Choose a device for experimenter responses? Enter the number corresponding to “Keyboard, USB Compliant Keypad” for number pad (or 4 for keyboard)
- Confirm that all information was input correctly.

Place the demo picture in front of the participant.

- Read the instruction verbatim to the participant. Say,

In this task, you will be shown correctly and incorrectly paired words from the previous scan. You will be asked to judge how sure you are that the two words were paired during part 1. At the bottom, you will see a rating scale with four response options. Please be sure to use all four options from the rating scale to express how sure you are of your answer.

Press the first button if you are sure that the two words are a correct pairing. Press the second button if you think the two words might be a correct pairing. Press the third button if you think the words might be an incorrect pairing. Press the fourth button if you are sure that the words are an incorrect pairing.

Also, sometimes you will see just the words “sure correct,” “maybe correct,” “maybe incorrect,” or “sure incorrect” presented. On those trials, just press the button corresponding to that response option.

[Subjects sometimes are confused about the new vs. old distinction, so make sure that they understand that part. Also, you should warn subjects after reading the instructions that this task goes very fast, and so they won't always have as much time to respond as they would like. So you should let them know that they should always try to get their answer in before the trial ends (ie, before the words disappear off the screen), and so if they think it's about to end they should try to give their best guess, because if the trial ends we miss their answer entirely.]

What the participant will see on the screen:

You will now be shown correctly and incorrectly paired words.

You will be asked to judge how sure you are that the two words were paired together during Part 1 of this task

Please make sure to distribute your responses across all four levels.

Press:

1: Sure Correct

2: Maybe Correct

3: Maybe Incorrect

4: Sure Incorrect

Sometimes you will see just the words “Sure Correct”, “Maybe Correct”, “Maybe Incorrect”, and “Sure Incorrect” presented.

In that case, just press the corresponding button.

- Start the demo and watch that the participant is responding correctly.
- When the demo is completed, ask the participant if they have any questions and ensure that they understand the task before proceeding to the next demo.

PAMret_Training:

- Go into the PAMret_fixed directory in Matlab and start the PAMret_training m-file.
- Choose a device for subject responses? Enter the number corresponding to “Keyboard, USB Compliant Keypad” for number pad (or 4 for keyboard)
- Choose a device for experimenter responses? Enter the number corresponding to “Keyboard, USB Compliant Keypad” for number pad (or 4 for keyboard)
- Confirm that all information was input correctly.

Place the demo picture in front of the participant.

- Read the instruction verbatim to the participant. Say,

For this next part, we’re going to have you do a 5-minute training exercise for the task you just did. This will just be the trials where you see the words “sure correct,” “maybe correct,” “maybe incorrect,” or “sure incorrect” presented. Press the button corresponding to the response option presented on the screen.

What the participant will see on the screen:

You will now be shown correctly and incorrectly paired words.

You will be asked to judge how sure you are that the two words were paired together during Part 1 of this task

Please make sure to distribute your responses across all four levels.

Press:

- 1: Sure Correct
- 2: Maybe Correct
- 3: Maybe Incorrect
- 4: Sure Incorrect

Sometimes you will see just the words “Sure Correct”, “Maybe Correct”, “Maybe Incorrect”, and “Sure Incorrect” presented.

In that case, just press the corresponding button.

DEMO: Spatial Working Memory Capacity Tasks--SCAP

Description: SCAP is a working memory task that tests the maintenance of spatial information over a delay. Participants are shown an array of 1, 3, 5, or 7 target yellow dots positioned pseudo-randomly around a central fixation. Delays vary by trial and can be 1.5, 3, or 4.5 seconds. After the delay, participants are shown a single green probe dot and are asked to determine if the probe was in the same position as any of the yellow dots from that trial. To minimize potential encoding by set size interaction, target stimuli are presented for 2 seconds, allowing participants to fully encode the target array even on the highest memory load levels. Half of the trials are true positive, and half are true negative.

SCAP Demo Details

For the demo, participants will complete 4 trials.

Directions for Administration and Scoring:

Materials:

Laptop

Number Pad

Left = blue button; Right = yellow button (or Left = n key; Right = m key if using the keyboard)

Estimated Time:

44 seconds

General Directions:

- Go into the SCAP directory in Matlab and start the SCAP_demo m-file.
- Choose a device for subject responses? Enter the number corresponding to “Keyboard, USB Compliant Keypad” for number pad (or 4 for keyboard)
- Choose a device for experimenter responses? Enter the number corresponding to “Keyboard, USB Compliant Keypad” for number pad (or 4 for keyboard)
- Confirm that all information was input correctly.

Place the demo picture in front of the participant.

- Read the instruction verbatim to the participant. Say,

This is a short-term memory test. You will be shown either 1, 3, 5, or 7 yellow dots.

After two seconds, these dots will disappear and the screen will be blank except for a plus

sign. After a delay, a green dot will appear. Your job is to say whether the green dot is in the same place as one of the yellow dots that were shown just before the delay.

Press the LEFT (blue) button if you think the green dot is in the same place as one of the yellow dots. Press the RIGHT (yellow) button if you think the green dot is in a different place than one of the yellow dots.

Please respond as quickly and accurately as possible.

[This task is pretty self-explanatory. The only thing subjects sometimes get confused on is which button is which, since it doesn't show on the screen. The first two trials on the task are very easy for most people, so you should look to see if they get them right or not. If they get those both wrong, it's a good sign that they're mixed up about something.]

NOTE: If not using the number pad, have the subjects respond with 'n' and 'm' for left and right

There are no on-screen instructions.

- Start the demo and watch that the participant is responding correctly.
- When the demo is completed, ask the participant if they have any questions and ensure that they understand the task before proceeding to the next demo.

DEMO: Stop-Signal Task

Description: The Stop-Signal Task is a psychological test that measures a person's response inhibition ability. Response inhibition is the ability to inhibit initiated responses. The Stop-Signal Task is a visual choice reaction time task that requires participants to respond to a target stimulus on all trials, but to try to inhibit initiated responses on trials in which a tone follows the target. On every trial, participants see a fixation in the middle of the screen, after which an arrow appears that points to either the left or the right. Participants are instructed to respond as quickly and accurately as possible by pressing the left button when they see a left arrow and a right button when they see a right arrow. On 25% of the trials, a stop signal (an auditory tone) will occur at a particular stop-signal delay (SSD) after the beginning of the stimulus presentation, signaling the participant to withhold his/her response on that trial.

The Stop-Signal Task is tracking in that the onset of each SSD depends on whether or not the participant successfully inhibited on the previous inhibition trial. If the participant successfully inhibits, the SSD on their next stop trial will be increased by 50 ms; if the participant failed to inhibit, the SSD on their next stop trial will be decreased by 50 ms. If the SSD is short, inhibition is relatively easy. If the SSD is long, the participant's motor response will be further into execution, leaving little time to inhibit its completion. In this way, the Stop-signal converges on a point at which the participant can successfully inhibit 50% of the time.

The Stop-Signal task is based on the race model, which assumes that the going and stopping processes are racing independently to either produce, or inhibit, a motor response, respectively. The Stop-Signal task therefore allows for the estimation of Stop-Signal Reaction Time (SSRT), or an estimation of an individual's inhibitory function. Reaction times are directly observable on Go trials. We can also determine the threshold at which participants successfully inhibit 50% of the time. By subtracting the average SSD at which participants successfully inhibit 50% of the time from the distribution of reaction times on Go trials, we can estimate a participant's average stopping reaction time, or SSRT.

Based on the tracking nature of this task, it is important that participants are performing both quickly and accurately. If participants slow down, the results will not be valid. Most people should be responding between 400-500 ms on Go trials, and should be achieving approximately 50% inhibition on Stop trials. If they are slower than 750 ms on Go trials, or are inhibiting less than 20% on Stop trials, the data may not be usable.

The duration of events (Go, Stop, and Null trials, which include ITI) were created with opseek and varies between approximately 50 msec to 4 msec (with an average of about 1.5 sec).

Stop Signal DEMO Task Details

The demo version of the Stop Signal Task consists of 8 trials (3 of which are Stop trials). The demo session includes two staircases (one staircase starts at 150ms, the other at 200ms), which represent the onset times for the stop-signal.

Directions for Administration and Scoring:

Materials:

Stop-signal Task

Number pad

*****THIS TASK HAS SOUND OUTPUT*****: the laptop volume needs to be turned on.

Left-arrow = blue button; Right-arrow = yellow button

Estimated Time:

25 sec

General Directions:

- Go into the STOPSIG directory in Matlab and start the stopfmriOSX_2stairs_demo

Place the demo picture in front of the participant.

- Read instructions verbatim to participant. Say,

We're going to review the task with the arrows and tones. During this task you will see an arrow in the middle of the screen pointing either to the left or right. As soon as you see the arrow, respond *as quickly and accurately as possible*, by pressing the LEFT (blue) button if it's pointing left and the RIGHT (yellow) button if its pointing right.

When you hear a beep, do not respond to that particular arrow. *Both going fast and stopping are equally important*. This task is designed to be difficult and for subjects to make mistakes, so don't get frustrated if it's hard. Just make sure NOT to slow down your

responses to wait for the beep so that you are no longer going when you are supposed to. You won't always be able to stop when you hear a beep, so just try your best.

[The way you phrase things for this task is VERY important, as it's very easy for subjects to end up doing the task wrong if you aren't careful. All of the subjects that have gotten to the MRI portion of the study will have done stop-signal during the behavioral LA2K battery, so most of them should know how to do it correctly already. However, if they are having trouble, it doesn't hurt to say something along the lines of "this task is tricky, because it's designed so that there's no way you could stop for every single beep, and in fact if you are that means you're doing the task wrong, because you're going too slow. We want this task to be hard, so just respond fast to the arrow every time and try to stop when you hear the beep. As long as you're able to stop for some of the beeps and you're going fast, that means you're doing it correctly." Also, if you see subjects noticeably slowing down to wait for the beep, you should let them know that we don't want them to do that.]

NOTE: If not using the number pad, have the subjects respond with 'n' and 'm' for left and right

What the participants see on the screen:

Press the left button if you see the arrow pointing left

Press the right button if you see the arrow pointing right

Press the button as FAST as you can when you see the arrow.

But if you hear a beep, try very hard to STOP yourself from pressing the button.

Stopping and going fast are equally important.

- Start the task; let participants read the instructions and press a button to begin.
- Monitor the participant as they begin the task to ensure that they are responding correctly and using the correct buttons.

When the demo is completed, ask the participant if they have any questions and ensure that they understand the task before proceeding to the next demo.

Stop Signal Behavioral Task Details

The behavioral version of the Stop Signal Task consists of 128 trials (25% of which are Stop trials). The demo session includes two staircases (one staircase starts at 150ms, the other at 200ms), which represent the onset times for the stop-signal.

Directions for Administration and Scoring:

Materials:

Stop-signal Task

Number Pad

*****THIS TASK HAS SOUND OUTPUT*****: the laptop volume needs to be turned on.

Left-arrow = blue button; Right-arrow = yellow button (or Left-arrow = 'n'; Right-arrow = 'm' if not using the button box)

Estimated Time:

6 min 4 sec

General Directions:

- Go into the Matlab>tasks>STOPSIG>orders folder.
- Pick a random pair of files with the same counterbalance number. (i.e. st17b1.mat and st17b2.mat)
- Copy the files into the STOPSIG folder.
- Relabel both of them by replacing the underlined number above with the subject number . (i.e. st17b1.mat will become st00001b1.mat)

In MATLAB:

- Go into the STOPSIG directory in Matlab and start the stopfmriOSX_2stairs_behav m-file (or, if not using the number pad, run **stopfmriOSX_2stairs**)
- Enter subject ID.
- If running stopfmriOSX_2stairs,
 - For “scan number”, enter 1
 - For “are you scanning”, enter 0

- For ladder values, enter 250 and 350

Place the demo picture in front of the participant.

- Read instructions verbatim to participant. Say,

Now we're going to run through the whole task with the arrows and tones. You want to respond *as quickly and accurately as possible* to the arrows, but to not respond when you hear a beep.

Remember that both going fast and stopping are equally important. Make sure NOT to slow down your responses to wait for the beep so that you are no longer going when you are supposed to. You won't always be able to stop when you hear a beep, so just try your best.

NOTE: If not using the number pad, have the subjects respond with 'n' and 'm' for left and right

What the participants see on the screen:

Press the left button if you see the arrow pointing left

Press the right button if you see the arrow pointing right

Press the button as FAST as you can when you see the arrow.

But if you hear a beep, try very hard to STOP yourself from pressing the button.

Stopping and going fast are equally important.

- Start the task; let participants read the instructions and press a button to begin.
- Monitor the participant as they begin the task to ensure that they are responding correctly and using the correct buttons.
- When the task is completed, ask the participant if they have any questions.
- When the task is completed, run the analyze program to examine their performance and give them feedback as needed.
- If someone completely does the task wrong, you can redo the full behavioral run if there is time.

- Type ls in the command line to bring up a list of files in the directory. Select the name of the file that has just outputted from that subject (<sub#>stop_fmri1_<date>.mat) and copy it.
- Run check_stopsig
(or **check_stopsig_keyboard** if they responded with ‘n’ and ‘m’)
- Enter behavioral filename: paste the name of the file that you copied

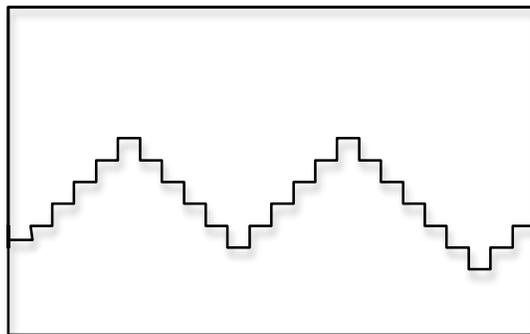
Stop-signal Feedback:

Give the subject quick feedback when you see the reaction time and error screen pop up. A good RT is between 400 and 500 ms usually (may be slower in this sample), and fewer than 4 errors is good. If the subject falls within that range, tell them they’re doing a great job and to keep their speed constant and keep up the good work. If they’re a little slower, just remind them that going and stopping are equally important and not to slow down on the go task. If they have too many errors, tell them to slow down a little on the go task. Also make sure to watch the subject so you can give them feedback based on how they respond (i.e., if they go very fast and never stop when they hear the high beep, have them slow down a little; if they keep slowing down as if they’re waiting for the high beep, emphasize that going and stopping are equally important and not to slow down on the go task).

After running the analyze program, you should look at the graph of stop-signal delays to make sure the subject is using the appropriate strategy.

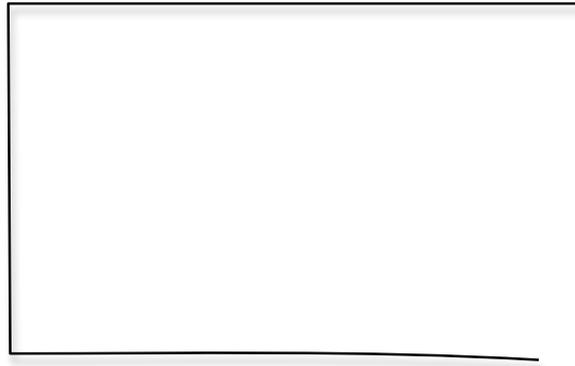
If the subject falls within the 400 and 500 RT range, and their staircase looks like this, say:

“You’re doing a great job; keep your speed constant and keep up the good work. You have found a good balance between responding quickly on the go task and stopping on the stop task.”



If their staircase looks like this, it suggests that the participant never stops. Suggest that they try going slightly slower on the go task and not to forget to try to inhibit as best they can on the stop task. Say:

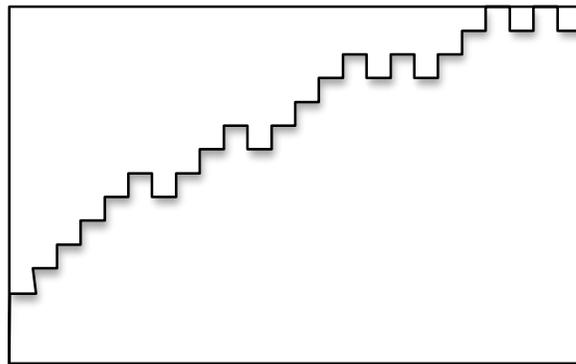
“Remember that going and stopping are equally important and don’t slow down on the go task to wait for the high beep or you aren’t doing the go portion of the task, which is just as important as the stopping portion. You won’t be able to stop every time you hear the high beep, we design the task that way, so just try your best and keep your speed constant.”



If they are constantly slowing down their responses to anticipate the beeps, their

staircase will look like this, indicating that they are paying too much attention to trying to stop and not maintaining their speed while going. They are likely slowing down their responses so much in order to stop more that they are no longer doing the go task quickly. Say:

”Remember that going and stopping are both important, so maybe you should slow down a bit on the go task so you push the correct buttons for the arrows and can stop some of the time, but remember not to continue slowing down so you’re waiting for the high beep.”



If the feedback pops up and RT is N/A and/or there are a ton of errors but the subject seemed to be doing the task correctly, it could be because they were using the wrong keys

DEMO: Task Switching

Description: In this task, the participant will see one of four images. They will be asked to make a response based on the task cue prior to, and above, the image. They will either have to respond to the images' color or the shape. Cues are "SHAPE" or "S" for the shape and "COLOR" or "C" for the color task. There are four stimuli: red box/triangle, red box/circle, green box/triangle, and green box/circle. On 33% of trials the task switches: the participant will be instructed to switch from responding to SHAPE to COLOR, or vice versa; on 67% of trials, the task remains the same across trials, but the cues change. The task measures reaction time as the task changes from trial to trial; in particular, switch cost can be calculated from the reaction times to switch task/same cue versus same task/switch cue.

Task Switching Demo Details

In the demo, participants complete 10 trials.

For each trial, participants see the task cue for 200 ms or 1200 ms and are presented the cue stimulus until a response is made. After a response is made, the inter-trial interval consists of a blank screen, which lasts 1600 ms (for a 200 ms task cue trial) or 600 ms (for a 1200 ms cue trial), such that the entire response-to-stimulus interval is constant (at 1800 ms).

Directions for Administration and Scoring:

Materials:

Laptop

Number Pad

Left = blue button; Right = yellow button (or Left = n key; Right = m key if using the keyboard)

Estimated Time:

48 secs

General Directions:

- Go into the TASKSWITCH directory in Matlab and start the TASKSWITCH_practice m-file.
- Choose a device for subject responses? Enter the number corresponding to "Keyboard, USB Compliant Keypad" for number pad (or 4 for keyboard)

- Choose a device for experimenter responses? Enter the number corresponding to “Keyboard, USB Compliant Keypad” for number pad (or 4 for keyboard)

Place the demo picture in front of the participant.

[Before reading the instructions, it is a good idea to mention that this task is very difficult for people, and that a lot of the time people need to redo the demo more than once, which is totally fine. That way, they won't feel stupid or get frustrated if they have trouble learning it on the first try.]

- The buttons for this task are counterbalanced during the behavioral LA2K training. There are therefore four different button order possibilities. Before the scan session, you should make sure that you know which of the four that they used previously.
- Read the instruction verbatim to the participant. Say,

BUTTON ORDER 1:

This is a demo of the task in which you will learn to press the LEFT (blue) button or the RIGHT (yellow) button in response to color and shapes.

The colors will be red or green. The shapes will be circles or triangles.

Each trial starts with a cue indicating whether you should respond to color or shape. Try to respond as fast and as accurately as you can for each trial.

If the cue is “COLOR” or “C” respond to the color. Press the LEFT button if the color is RED. Press the RIGHT button if the color is GREEN.

If the cue is “SHAPE” or “S” respond to the shape. Press the LEFT button if the shape is a TRIANGLE. Press the RIGHT button if the shape is a CIRCLE.

So, again, if the cue is “COLOR” or “C”:

Press the LEFT button if the color is RED.

Press the RIGHT button if the color is GREEN.

If the cue is “SHAPE” or “S”:

Press the LEFT button if the shape is a TRIANGLE.

Press the RIGHT button if the shape is a CIRCLE.

BUTTON ORDER 2:

This is a demo of the task in which you will learn to press the LEFT (blue) button or the RIGHT (yellow) button in response to color and shapes.

The colors will be red or green. The shapes will be circles or triangles.

Each trial starts with a cue indicating whether you should respond to color or shape. Try to respond as fast and as accurately as you can for each trial.

If the cue is “COLOR” or “C” respond to the color. Press the LEFT button if the color is RED. Press the RIGHT button if the color is GREEN.

If the cue is “SHAPE” or “S” respond to the shape. Press the LEFT button if the shape is a CIRCLE. Press the RIGHT button if the shape is a TRIANGLE.

So, again, if the cue is “COLOR” or “C”:

Press the LEFT button if the color is RED.

Press the RIGHT button if the color is GREEN.

If the cue is “SHAPE” or “S”:

Press the LEFT button if the shape is a CIRCLE.

Press the RIGHT button if the shape is a TRIANGLE.

BUTTON ORDER 3:

This is a demo of the task in which you will learn to press the LEFT (blue) button or the RIGHT (yellow) button in response to color and shapes.

The colors will be red or green. The shapes will be circles or triangles.

Each trial starts with a cue indicating whether you should respond to color or shape. Try to respond as fast and as accurately as you can for each trial.

If the cue is “COLOR” or “C” respond to the color. Press the LEFT button if the color is GREEN. Press the RIGHT button if the color is RED.

If the cue is “SHAPE” or “S” respond to the shape. Press the LEFT button if the shape is a TRIANGLE. Press the RIGHT button if the shape is a CIRCLE.

So, again, if the cue is “COLOR” or “C”:

Press the LEFT button if the color is GREEN.

Press the RIGHT button if the color is RED.

If the cue is “SHAPE” or “S”:

Press the LEFT button if the shape is a TRIANGLE.

Press the RIGHT button if the shape is a CIRCLE.

BUTTON ORDER 4:

This is a demo of the task in which you will learn to press the LEFT (blue) button or the RIGHT (yellow) button in response to color and shapes.

The colors will be red or green. The shapes will be circles or triangles.

Each trial starts with a cue indicating whether you should respond to color or shape. Try to respond as fast and as accurately as you can for each trial.

If the cue is “COLOR” or “C” respond to the color. Press the LEFT button if the color is GREEN. Press the RIGHT button if the color is RED.

If the cue is “SHAPE” or “S” respond to the shape. Press the LEFT button if the shape is a CIRCLE. Press the RIGHT button if the shape is a TRIANGLE.

So, again, if the cue is “COLOR” or “C”:

Press the LEFT button if the color is GREEN.

Press the RIGHT button if the color is RED.

If the cue is “SHAPE” or “S”:

Press the LEFT button if the shape is a CIRCLE.

Press the RIGHT button if the shape is a TRIANGLE.

[Subjects have a lot of trouble learning the buttons for this task. As a result, you need to watch carefully when they respond to the demo to make sure they are doing it wrong. If they get a number of mistakes, you should re-explain which button is which, and, if necessary, go over the instructions again. Sometimes, if people have a lot of trouble learning the buttons, it can help to give them a strategy to remember them (ie, think about them in your head over and over while you're practicing). It's not uncommon to have to go through the demo 5 times for some subjects, so keep at it as much as is necessary until they're reasonably good at it.]

NOTE: If not using the number pad, have the subjects respond with ‘n’ and ‘m’ for left and right

There are no on-screen instructions.

- Start the demo and watch that the participant is responding correctly.
- When the demo is completed, ask the participant if they have any questions and ensure that they understand the task before proceeding to the next demo.

Preparing for Scan Session

Metal Screening

- All participants need to complete a metal screening form on the DAY OF scanning.
 - Review the metal screening form once it is complete and sign it as the experimenter once you are certain it is safe to screen the participant.
 - Go over any safety issues based on their responses (e.g., possible warming of tattoos during scanning).
- Participants must complete a metal screening form for each scan session.
- Tattoos that are not located on the head or neck and are not covering their entire body are generally fine to scan with. However, there is a possibility, depending on the ink that was used, that the area with the tattoo would begin to heat up during the scan. Potential participants with tattoos should be informed that this risk exists, and in the event that their tattoo area has unusual sensations during the scan they can inform us and we will terminate it immediately (the heating up is a gradual process, so as long as they let us know immediately there should be little to no risk). The more “reputable” the place they got the tattoo, the less likely it will be a problem (so prison tattoos are very unsafe, but a tattoo shop in the United States is probably OK).
- If there are any doubts regarding the day-of metal screening responses, DO NOT ALLOW the participant to enter the scanner room and contact a BMC tech.
- Additional questions to ask the DAY OF scanning:
 - **Do you wear glasses? If so, do you know your prescription?** (This is useful to know ahead of time so that the appropriate MR-compatible lenses can be selected during set-up).
- Provide the participant with a general overview of the procedure and scanner so they know what to expect.

During the scan, you'll be laying down on a bed and slide into a long horizontal tube. You'll be wearing goggles that will show you the computer tasks, and you'll have a button box that you'll use to respond. We'll also give you a headset that we'll use to communicate, since we'll be outside the scanner room during the MRI. We'll talk to you in between each 5-10 minute scan, but we won't be able to hear you while the scanner is running since it makes a lot of noise. If there's an emergency, though, you'll have a ball attached to the headset that you can squeeze at any time that will alert us to stop the scan

and talk to you. You can also feel free to use this ball for things that aren't emergencies, if it's something we'd want to know about right away. For example, if you forget the instructions to the task or it doesn't seem to be working correctly, you can definitely use it since fixing those things right away that would save us a lot of time. For things that aren't as important, though, like if you have to go to the bathroom but can hold it for five minutes, it's better to wait until the current task is finished to talk to us, since we have to restart the entire run if we stop it early.

As I mentioned earlier, the scanner makes a lot of noise while it's running, but that's totally normal, and we'll give you earplugs and noise blocking headphones that will cancel a lot of it out. You'll also feel some shaking during the scan, but that's also normal and isn't anything to worry about.

You'll be in the scanner for about 45 minutes, and during that time we're going to ask that you try to keep your head as still as you possibly can. The pictures the MRI takes are just like a camera, in that if your head is moving the data we get comes out blurry. We'll put little pillows next to your head to remind you to keep still, but need you to try too. Also, a lot of people don't realize this, but it's actually better not to move any part of your body while we're taking pictures. The type of movement that we're talking about is just a millimeter or two, so even if you don't think you're moving your head, it'll generally move a bit when the rest of your body does. If you are feeling really antsy and need to stretch out, the best time to do this is in between scans when we're explaining the next part. You still want to keep your head as still as possible at these times since we want it to remain in the same location, but it's less crucial if you accidentally move a millimeter or two.

Finally, as you probably already know, for some people the scanning tube can feel cramped and your whole body will be going inside of it. Since you'll be wearing the goggles the whole time though, you probably won't be too aware of it. If you start to feel anxious during the scan though, you should definitely let us know and we can take you

out at any time.

Do you have any questions?

- If the participant has questions about fMRI, see “Educate About fMRI” appendix.

For session 1, give the participant a general overview of the order to scans and tasks (waiting on counterbalancing).

If the participant is particularly nervous about the scan, or requests to have a demonstration, use the MR Simulator.

MRI Simulator:

1. Power the goggles on that are attached to the computer. A power light should come on.
2. Turn the computer on, and open iTunes.
3. Check that the goggles are showing the image of the computer screen. If not, check that they are plugged in correctly and are powered on.
4. Give the goggles to the subject and have them put them on.
5. Have the subject lie down in the scanner bed, just as one would in the real scanner.
6. Inform the subject that you are putting the coil on over their head, and snap that piece on.
7. Tell the subject that you are going to push the bed into the scanner. Slowly push them in, checking to make sure that they are comfortable.
8. Tell the subject that you are going to put the sound on to emulate the scanner noise. On the computer, turn on the scanner noise in iTunes.
9. Lightly bang the front of the scanner with your fist to emulate the shaking that occurs in the real scan.
10. After about a minute, tell the subject that you are going to pull them out, and slowly bring the bed outward.
11. Remove the goggles. **Make sure to power the goggles off.**
12. Turn off the computer monitor.
13. Ask the subject if they have any questions about the scanning process, and if they think they will be fine to handle the real scan.

At the Scanner

- Have the participant go to the restroom.
- Make a note if the participant smoked before the scan.
- Instructions to go through with the participant before scanning:
 - Take out EVERYTHING from your pockets, safe or not, including:
 - all jewelry (necklaces, pins, rings, earrings).
 - all hair accessories.
 - all body piercing.
 - all dentures, false teeth, partial dental plates.
 - hearing aids.
 - eyeglasses or colored contact lenses.
 - your watch, pager, cell phone, credit cards, and all other cards with a magnetic strip.
 - ASK DIRECTLY TO DOUBLE-CHECK: Are there any remaining metal/objects???
 - Have them show you their pockets, inside-out.

Metal Check

- All participants and staff must remove all objects from their person before entering the scanner room; it is your responsibility to assure that the participant has all objects removed and has no potentially dangerous objects on their person.
- Do a metal check with the ferromagnetic screening wand, holding the wand one inch or less from the body. Do not rub them directly over the eyes

Weigh the participant

Scan Session

Total Estimated Time: 1 hr

Examiner's Preparation Checklist for Scan Session

Completed	Task
<input type="checkbox"/>	Two MRI Safety Certified individuals are available and will be present for the entirety of the scan.
<input type="checkbox"/>	Metal screens completed (ALBMC required and extended)
<input type="checkbox"/>	Restroom break completed
<input type="checkbox"/>	Silence all phones
<input type="checkbox"/>	All metal and belongings removed; store in room or in lockbox.
<input type="checkbox"/>	Metal-check of the participant with the wand completed
<input type="checkbox"/>	Instruct participants at scanner (goggles, button box, squeeze bulb, respiratory belt, earplugs and headphones)
<input type="checkbox"/>	Set-up participant in the scanner

Materials:

Laptop with Dongle and Charger

Scan log and Payment

Earplugs and Headphones; Goggles; Button box; Squeeze bulb

Set Up

Laptop Set-up

- while the participant is using the restroom and removing belongings
- Laptop should be off to start.
- Plug laptop into a power source.
- Unplug the black cable (on the right) and the USB and headphones cable (on the left) from the scanner's laptop and plug them into the laptop. Make sure that the headphones cable is plugged into the slot with the headphones picture.
- Unplug the back black cable from the silver trigger box on the shelf above.
 - Switch the knob on the front end to 2.
- Start the laptop.
- Turn on the black box on the left of the scanner laptop (transducer power supply), if it is not already on.
- Turn on the white box on the shelf above (visua-stim controller), if it is not already on.
- Plug the black cable back into the silver trigger box on the shelf above.
- Start Matlab.
 - If Matlab is not recording responses, try closing Matlab, unplugging and re-plugging the black cable into the trigger box, and restarting Matlab.
- Set-up display on the laptop: check Display Menu → Detect Displays and make sure Mirroring is ON. The resolution should change and the laptop's screen should be displayed on the scanner's other monitor.
- Turn off wireless. No other programs should be running.

- Double-check yourself to make sure that you are SAFE to go into the scanner:
- **Check:** go inside and check that the screen is seen through the goggle. If not, check the goggle control box near the floor and next to the scanner. Make sure that the light indicator is set to ‘ON’. If you are still not seeing anything, check the laptop in the console room to make sure Mirroring is ON. If the image is still not visible on the goggles, try powering both boxes on and off.
- **Check:** In Matlab, in directory, go into the STOPSIG directory and type **test_sound** while someone listens into the headphones. Make sure that it is at a comfortable level. The middle column of the Sound Control should be set to around 55, and volume on the laptop should be set to medium-high.
- **Check:** Someone press all 4 buttons of the button box and check that Matlab records “b y g r” (in that order).
- **Check:** Start your script and run a few trials, with someone pressing the button box in response. Stop the program and check the response variable from the script to make sure that button presses were collected.

Note: Make sure that the task is set up and the instructions are on the screen before reading the instructions to the participant.

Button Box

How to change device to our button box

1. Click dial once
2. Scroll to yes in “change modes” menu and click dial once
3. Scroll to “manual config” and click dial once
4. Scroll to “usb” and click dial once – this give you the menu to select your button box or hand-held device
5. Scroll to **HHSC – 1x4-L** and click dial once
6. Scroll to **HID KEY NAR** and click dial once.

Troubleshooting

1. *If you see “USB” flashing after you’ve selected the response setting, plug in the USB plug into the computer*
2. *If you get lost in the selection process, just scroll down to “back” until you get to the proper menu.*

Respiratory Belt and Pulse Oximeter Set-up

Setup outside the scanning room:

1. Check to make sure that the power light of the amplifier is turned on. If not, the switch to turn it on is located on the back

2. Plug the USB cable labeled “keyspan” into the BMC laptop.
3. Log onto the BMC laptop (name = albmc, password = albmc)
4. On the toolbar at the bottom of the computer screen, open AcqKnowledge
5. In the folder Documents/CNP, there will be folders for each subject. Make a folder for the subject number that you are currently running. This is where the data will be saved.
6. In the Documents/CNP folder, there are two templates: “3min_temp pulse+ox,” which is used for the breath holding task, and “5.2min_temp pulse+ox,” which is used for the resting scan. Load the appropriate template for the scan you are doing first.

Setup inside the scanning room:

1. The respiratory belt is located in the drawer at the front of the room (in front of the window). The draw is labeled “GSR Equipment – Poldrack Lab.” The belt itself is labeled “CNP.”
2. Put the belt on the subject just above the abdomen, slightly above the belly button. Loop the belt through the buckle, and Velcro it on tightly. The buckle should be centered above the subject’s belly button. The belt should be tight enough to stay on firmly, but not so tight that it impedes the breathing. Ask the subject if it is a comfortable tightness.
3. The cord on the belt connects to a grey cord that is located in the tall cabinet next to the drawers against that wall. The cord should be labeled “respiration” on its connector, and is on a shelf labeled “Mayer”
4. The respiratory belt has three connectors – 2 blue, and 1 black. The grey cord that they plug into has 5 different slots that they can be plugged into. The blue connectors should be plugged into the 2nd and 4th slots on the grey cord (labeled with red and white circles). It does not matter which blue connector goes into which of the two slots. The black connector should be plugged into the 3rd, middle slot (labeled with a black circle). The two outer slots should be empty.
5. Connect the pulse oximeter, which is connected to a white cord in the same cabinet as the respiratory belts. Place the pulse monitor on the subject’s LEFT INDEX finger
6. At this point, the respiratory belt and pulse oximeter should be completely set up. Before putting the subject into the scanner, make sure that the equipment is functioning properly by testing it on the computer outside.

NOTE: When the subject lays down on the table, you should ask them whether the belt is still tight. Some people may find that the belt becomes looser when they lay down, so adjustment may be necessary.

Calibrating the pulse oximeter:

1. On module, slide Calibration switch to OFF
2. On module, set all the Signal Channel Enable switches to ON
3. On module, set Bank Select switch to 4th bank (bottom position: channels 4, 8, 12, 16)
 - ** if module setup differs, then Bank Select switch may be different AND output signal channels may change #
4. In AcqKnowledge, go to Setup Channels
5. Move red dot to A4 (O₂ saturation)
6. On module, turn Calibration switch to CAL LO
7. In AcqKnowledge, click on Cal2
8. On module, turn Calibration switch to CAL HI
9. In AcqKnowledge, click on Cal1
10. Type in these MAP values of not already set:

Cal1 = 100

Cal2 = 10

11. Repeat steps 5-10, this time for A8 (Pulse Waveform)
MAP values:

Cal1 = 10

Cal2 = -10

12. Repeat steps 5-10, this time for A12 (Pulse Rate)
MAP values:

Cal1 = 250

Cal2 = 0

13. Repeat steps 5-10, this time for A16 (Module Status)
 - a. MAP values:

Cal1 = 16

Cal2 = 0

14. After calibrating all four channels, turn Calibration switch to ON
In AcqKnowledge, make sure the following is set:

MP100 → setup acquisition → using memory
Acquisition length = 5.2 min for resting-state and 3 min for breath-hold

Using the respiratory equipment during the scan (Note: this may change once the trigger is working with the belt):

1. Make sure that the appropriate template file is loaded into AcqKnowledge on the BMC laptop.
2. Simultaneously click “Start” in AcqKnowledge and “Continue” on the scanning computer. If a window pops up in AcqKnowledge asking if you would like to overwrite the existing data, click “Okay.”
3. There are buttons on the toolbar to turn on autoscaling, which will help you to visualize the data to make sure it is being collected correctly.
4. Use “Save as…” to save data in 2 formats: graph and text. Label files as:
 - a. CNP_<SUBID>_resp_rest.graph & .txt
 - b. CNP_<SUBID>_resp_bht.graph & .txt
5. If necessary, load the template for the next scan.

After Scanning:

1. Take the belt off the subject, and carefully disconnect it from the grey cord. Neatly coil the wire on the belt and put it back into the “GSR Equipment – Poldrack Lab” drawer.
2. Neatly coil the grey wire, and put it back on the appropriate shelf in the white filing cabinet. **NOTE: try to coil the wire in a way that won’t strain it. This is very important, because if you strain it too much it will stop working eventually.**
3. Unplug the USB connector labeled “keyspan” from the BMC laptop.
4. Put the respiratory data (the .txt files) on a USB memory stick or email it to yourself after each scan session. All respiratory data should be uploaded to the FUNC folder :

/space/raid2/data/poldrack/CNP/physio_data/<SUB NUMBER>

Troubleshooting:

-Is the power light on the amplifier on?

-Did you plug the blue and black connectors on the belt into the correct slots?

-Is the USB cable labeled “keyspan” plugged into the BMC laptop?

-In the room next to the scan control room (through the sliding glass doors) there are places where the equipment should be plugged in. Ask one of the techs if it looks correct.

In the Scanner Room

- Check the temperature in the scanner room: temperature should not exceed 72 degrees and humidity should not exceed 60%.
- Install the subject in the scanner:
- After making sure they are SAFE to enter the scanner, escort them into the scanner room.
- Give earplugs to put in—they MUST use hearing protection
- Have the subject sit down on scanner bed
- Remind the participant of the following:
 - Hands and feet in, and watch for cables!
 - Do not clasp your hands (or create a loop with your limbs).
 - When we are getting you set-up, alert us to any discomfort or pain so that you can be re-positioned within the magnet, sooner than later.
 - Ask if you have any questions at all before beginning a task.
 - DO NOT FALL ASLEEP
- Give headphones—they MUST use hearing protection
- Have the subject lie down
- Give the subject leg support pad
- Make sure they are comfortable before entering the bore. Make sure they have a sheet or blanket if cold, or the fan is on if they are warm.
- Check the shoulders and head position. Make sure the subject's head is comfortable. If their head is too low, add padding to raise their head.
- Indicate where the squeeze bulb is with their left hand
- Give button-box in right hand and remind them how to hold/press buttons. Make sure the first two fingers are on the blue (1) and yellow (2).
- Give goggles
- Tape goggle to earphones

- Put foam pads next to the earphones to keep the subject's head in place; make sure head is straight.
- Put on headcoil. If the headcoil is pressing down on the goggle, you will have to remove some of the padding beneath their head (remove big body pad from the scanner bed and replace it with the white synthetic cushions) and try to replace the head coil again.
- Ask the subject if everything is OK.
- Have the subject close their eyes and align the head with the red light. Align the head as straight as possible.
- Tell the subject that you will move the bed into the bore of the magnet if they are ready.
- Put the scanner bed into the magnet while holding onto the cords to make sure none of them get stuck or pull
- Once inside, ask again if everything is OK. Sometimes the goggles move and you have to readjust them
- If OK, tell the subject that you will speak to them from outside the control room
- Close the door and flip the switch on the door UP so that the sides fill with air
- Use the audio controls to check that the subject is OK and can hear you clearly and comfortably

Register the participant at the console:

- Under Patient Menu on the scanner console, chose ‘Register Patient’
 - Enter subject code (ID #) for both patient Last name and Code. Make sure to enter in the correct ID here.
 - Skip date of birth
 - Enter sex
 - Enter age, not birthdate (from the metal screening form)
 - Skip height
 - Enter weight
 - Referring physician is POLDRACKGROUP. This is very important, as it determines access to the data!
 - Under Study, select Poldrack, TRIO protocols
 - Select the CNP protocol under POLDRACK
 - Position is always ‘head first supine’
 - Enter user’s initials
- If you have entered all information next to BOLD-lettered fields, you should be able to click the Exam button. A confirmation box will appear, confirm that the info is correct and click Confirm.
- Select CNP under Programs and then all of our protocols will appear
- For each scan in the counterbalancing list, highlight the scan name under Protocols and select the “<<” arrows.

*It is important to enter the participant’s correct weight, age and sex correctly before scanning.

Scanning

- Start with structural scans; notify the subject that scanning will begin
- Localizer:
 - Highlight the Localizer scan in the Poldrack CNP protocol list and select the “<<” arrows to add it to current scan
 - Then the name of the scan will appear on the left side of the screen; double-click it
 - Check that the head is inside the circle
 - Click Apply; Click Continue on the pop-up window to start scan
- Matched Bandwidth
 - Highlight the Matched Bandwidth Hi-Res scan in the Poldrack CNP protocol list and select the “<<” arrows to add it to current scan
 - Position slices so that the whole brain is covered
 - Click Apply; Click Continue on the pop-up window to start scan
- Begin each of the following scans depending on the participant’s **counterbalance log**.
- See each task for further scan set-up instructions, which are presented below in alphabetical order.
- Make sure to read the instructions on the screen aloud to the participant when the instruction screen is presented. **READ ALL INSTRUCTIONS VERBATIM**. Then, if there are additional questions, you can elaborate.
- Remember to monitor the participant (with the silver button box outside of the scanner) to ensure they are responding correctly using the proper fingers and that the button box is not backwards.
- Make sure to type in clear all before each new task
- Before DTI, alert the participant that this scan will sound differently and vibrate more, but to not worry or move.
- While scanning, maintain verbal contact with the participant, who should have access to a panic button during the scan. Let the participant know that they can call for help and that they have not lost control.
- Stop the study if a participant appears to be very anxious or reports feeling very nervous, then remove the participant from the scanner immediately.

SCAN: Balloon Analog Risk Task (BART)

Brief Description: The BART is a computer task that serves as a behavioral index of basic risk decision-making. Participants blow up virtual balloons (by pressing one button) or stop blowing up the balloon (by pressing another button). Participants gain points with each pump for green balloons, but lose all points if the balloon explodes. Each balloon has an explosion threshold that varies from balloon to balloon.

BART Scan Details

For the scan version, participants blow up approximately 30 virtual balloons, although this total number of balloons depends on performance and is pretty variable. They can pump the balloon with one button response or stop pumping with another button response.

For both the green (experimental) and white (control) balloons, the balloon disappears once the participant responds (either pump or quit). The timing is set so that the duration between balloons is variable ($1 + \text{rand}(2)$). The duration of the feedback screen (whether it is running total with a green balloon, exploded green balloon, or running total with a white balloon) is always 2 sec. The intertrial interval is variable (although the mean ITI = 4 sec, the min ITI = 1 sec, and the max ITI = 12 sec).

267 TRs

Materials:

Laptop

Button-box: Pump = blue button; Stop = yellow button

Task Running Time:

Approximately 8 min 30 seconds

Total Run/Scan Time: 9 min 2 sec

BART Scan Set-up:

- Highlight the BART scan in the Poldrack CNP protocol list and select the “<<” arrows to add it to current scan
- Double-click on the BART scan name once it is on the left
- Then right click the MBW scan above it, and select Copy Parameters
 - Click OK on the pop-up window (should be “Center of slice groups & Sat. regions”)
 - The yellow parameters should adjust

- Go to the BOLD tab and make sure that you are collecting the number of measurements that you want
- Click on the SCAN tab
- Coordinate with laptop/trigger
- Pause window will pop up, Click Continue when laptop/trigger is ready to start the scan

Directions for Scanning:

- Clear all
- Go into the BART Matlab directory and start the **BART_CNP_timer** m-file.
- Enter subject code.
- Enter run #. **1**
- Enter starting amount. **0**
- Are you scanning? **1**
- Subject device: **Keyboard 932**
- Experimenter device: **Keyboard, Apple Internal Keyboard / Trackpad**
- Confirm that all information was input correctly.
- Start the task to bring up the instruction screen; let participants read the instructions while you read instructions verbatim to participant. Say,

This task is the one where you score points by inflating balloons. You push the first button to inflate the balloon, and the second button to stop inflating and move on to the next one. The more you inflate the balloon the more points you'll get, but if you inflate it too much the balloon will pop and you won't get any points. There are two different colors of balloons, green and white. Green balloons give points, but white balloons don't, so when you see a white balloon you can just inflate it until it goes away to move on to the next one. You only get a limited number of balloons, so try to get as many points as you can on each. Any questions?

[This task paced by the participant, and therefore does not always end at the same time. It should, however, always end before the scanner does, and will put up a blank gray screen for the remaining duration of the scan. Once the scanner itself stops running, push a key on the keyboard to quit out of the task]

What the participants see on the screen:

Press the **FIRST** button to inflate the balloon.

Press the **SECOND** button to stop inflating and move onto the next balloon.

If the balloon explodes, you will get no points.
Green balloons give points, but white do not.
When you see a white balloon, inflate it until it goes away to move o.

Try to get as many points as you can!

- With the instructions screen up, and the pause window up on the scanner console, press RETURN on the scanning computer while simultaneously pressing CONTINUE on the scanner console.
- MONITOR the participant to ensure that they are responding correctly and using the correct buttons. You can check the silver button box. Stop immediately if they are using the incorrect buttons and restart.
- The task will likely end before the scan; press any key to close out of the BART program and wait for the scan to end.
- At the end of the task, a Goodbye screen will appear. Say, [Great job! Please wait while we set up the next task.](#)

SCAN: Breath-Holding Task

Description: Subjects are asked to alternate between breathing regularly and holding their breath. This task should be performed while the subject is wearing a respiratory belt.

BH SCAN Details

For the scan, participants will complete 5 cycles.

79 TRs

Materials:

Laptop

Estimated Time:

2 min 34 sec

Total Run Time: 2 min 46 sec

Breath Holding Scan Set-up:

- Highlight the BreathHolding scan in the Poldrack CNP protocol list and select the “<<” arrows to add it to current scan
- Double-click on the BreathHolding scan name once it is on the left
- Then right click the MBW scan above it, and select Copy Parameters
 - Click OK on the pop-up window (should be “Center of slice groups & Sat. regions”)
 - The yellow parameters should adjust
- Go to the BOLD tab and make sure that you are collecting the number of measurements that you want
- Click on the SCAN tab
- Coordinate with laptop/trigger
- Pause window will pop up, Click Continue when laptop/trigger is ready to start the scan

Set-up of Respiratory Belt:

See p. 56

Directions for Scanning:

- Clear all
- Go into the BHT directory in Matlab and start the **BHT_timer** m-file.
- Enter subject number.

- Enter input device for participant : **Keyboard, 932**
- Enter input device for experimenter. **Keyboard, Apple Internal Keyboard / Trackpad**
- Confirm that all information was input correctly.
- Start the task to bring up the instruction screen; let participants read the instructions while you read instructions verbatim to participant. Say,

This task is the one where you have to hold your breath. When you see the green bar, it means you can breathe normally. When you see the yellow bar with the blue line moving up, it means you should inhale until the blue line reaches the top. And once the blue line is at the top you'll see the red bar, which means that you should hold your breath until the green bar comes back. So again, green bar means breathe normally, yellow bar means start breathing in, and red bar means hold your breath. You'll do that about five times.

Any questions?

What the participants see on the screen:

When the bar is GREEN, breathe normally.

When the bar is YELLOW and the blue line is moving upwards, take a deep breath and prepare to hold it.

When the bar is RED, hold your breath and do not breathe until the bar is green again.

- With the instructions screen up, and the pause window up on the scanner console, press RETURN on the scanning computer while simultaneously pressing CONTINUE on the scanner console.
- MONITOR the participant's respiration to make sure they are doing the task correctly
- At the end of the task, a Rest screen will appear. Say, **Great job! Please wait while we set up the next session.**

DTI-64DIR SCAN:

Brief Description: This scan collects information about the diffusion of water in tissue in order to produce neural tract images. Participants should remain relaxed and still during this session.

DTI SCAN Details

Total Duration: 7 min 44 sec

DTI64dir Scan Set-up:

- Highlight the DTI64dir scan in the Poldrack CNP protocol list and select the “<<” arrows to add it to current scan
- Position volume
- Click Apply; Click Continue on the pop-up window to start scan

Directions for Scanning:

- There is nothing to display.
- Instructions for the participant:

“We are going to take some pictures now, and there’s nothing that you need to do for this scan. This scan will sound different than the other ones, and it will produce more vibration, but please remain relaxed and still.”

MP-RAGE STRUCTURAL SCAN:

Brief Description: This scan collects high-resolution structural images. Participants should remain relaxed and still during this session.

MP-RAGE SCAN Details

Total Duration: 7 min 30 sec

MP-RAGE Scan Set-up:

- Highlight the MP-RAGE scan in the Poldrack CNP protocol list and select the “<<” arrows to add it to current scan
- Position volume
- Coordinate with Reversal Learning training task set-up
- Click Click Apply; Click Continue on the pop-up window to start scan

Directions for Scanning:

- There is nothing to display.
- Instructions for the participant:

“We are going to take some pictures now, and there’s nothing that you need to do for this scan. Please remain relaxed and still.”

SCAN: Paired Associates Memory Task (PAMenc & PAMret)

Brief Description: This experiment consists of two parts. Part 1 consists of two types of trials. On some trials, participants see two words. The capitalized word is the target word and the lowercase word is the paired word. Two pictures appear beneath the words. The participant is asked to press the left key if the target word is on the left side of the screen, and the right key if it is on the right side of the screen. Participants are also asked to remember the words pairs as best they can.

~~In the second part of the experiment, participants see a single word at the top of the screen. Three options will appear at the bottom of the screen. Some of these words were target words in Part 1, while others were not shown before. Participants are asked to press the left key to indicate that the first word was paired with the top word, press the middle key to indicate that the middle word was paired with the top word, and to press the right key to indicate that the word at the top is new.~~

PAM Scan Details

In PAMenc, participants will complete 64 encoding trials (each presents a new word/picture pair). 24 trials are control trials (pairs of scrambled stimuli) and 40 are memory trials (pairs of line drawings of objects). The stimuli used for the LA5C are non-overlapping with the stimuli used for the RK in the LA2K computerized battery.

Control trials last 2 seconds and encoding trials last 4 seconds (1 second with just the words and 3 seconds with words + pictures). All the time between trials that is unaccounted for is considered null time for baseline. For all encoding trials, one figure is in black and white, and one is in color (orange). The subject must indicate by button press which side the colored object is on (this is the same as the RK encoding paradigm, but different from the NAPLS PAM encoding). Subjects are instructed to remember the objects and the relationship between the objects. The ITI is jittered.

The retrieval task requires the subjects to rate their confidence in their memory of the pairing. There are 4 possible response options ranging from "Sure correct" to "Sure incorrect". These can be analyzed later as a spectrum, or binarized into yes/no type responses.

There are 104 retrieval trials, 24 control trials (on one side of the screen is one of the 4 retrieval confidence response options "Sure correct", "maybe correct", "maybe incorrect", or "sure incorrect". On the other side of the screen is "xxxx". Subjects are asked to press the button (1-4) that corresponds to the response option displayed). 40 correct trials (items are shown paired as they were at encoding) and 40 incorrect trials (items are shown paired differently than they were at encoding -some objects are the same, just paired incorrectly).

PAMenc: 242 TRs

PAMret: 268 TRs

Materials:

Laptop

Button-box: left = blue button; right = yellow button

Far left = blue button; Middle = yellow button; Far right = green button

Task Running Time:

PAMenc: 6 min 28 sec

Total Run Time: 6 min 40 sec

PAMret: 6 min 56 sec

Total Run Time: 7 min 12 sec

General notes on this task:

- This task has 2 m-files (PAMenc and PAMret) and they should always be run in that order.

PAMenc Scan Set-up:

- Highlight the PAMenc scan in the Poldrack CNP protocol list and select the “<<” arrows to add it to current scan
- Double-click on the PAMenc scan name once it is on the left
- Then right click the MBW scan above it, and select Copy Parameters
 - Click OK on the pop-up window (should be “Center of slice groups & Sat. regions”)
 - The yellow parameters should adjust
- Go to the BOLD tab and make sure that you are collecting the number of measurements that you want
- Click on the SCAN tab
- Coordinate with laptop/trigger
- Pause window will pop up, Click Continue when laptop/trigger is ready to start the scan

Directions for Scanning--PAMenc:

- Clear all
- Go into the PAM_fixed/ PAMenc_fixed directory in Matlab.
- Start the **PAMenc_timer** m-file.
- Enter subject code.
- Enter input device for participant. **Keyboard, 932**

- Enter input device for experimenter. **Keyboard, Apple Internal Keyboard/Trackpad**
- Confirm that all information was input correctly.
- Start the task to bring up the instruction screen; let participants read the instructions while you read instructions verbatim to participant. Say,

This next task is the two-part memory test. In Part 1, you will see a set of word pairs and their corresponding pictures. One picture is presented in orange, while the other is in black-and-white. Please press the first button when the orange image is on the left, and press the second when the orange image is on the right.

In addition to pressing the button, your task is to memorize the word pairs by trying to form meaningful relationships between them. For example, you could make a story about the two words, or think about how the two words could go together in real life. In part 2, you will be asked to judge how sure you are the words were shown together.

Also, on some trials, pairs of orange and black-and-white squares are presented. On these trials, just press the first button if the orange square is on the left, and the second button if the orange square is on the right.

What the participants see on the screen:

You will see two words and two pictures on the screen. One picture is presented in color.

Press the FIRST button if the colored image is on the left.

Press the SECOND button if the colored image is on the right.

Your task is to memorize the word pairs by trying to form meaningful relationships between them.

Try to remember the word pairs as best you can, as you will be tested on them soon.

- With the instructions screen up, and the pause window up on the scanner console, press RETURN on the scanning computer while simultaneously pressing CONTINUE on the scanner console.
- MONITOR the participant to ensure that they are responding correctly and using the correct buttons. You can check the silver button box. Stop immediately if they are using the incorrect buttons and restart.
- At the end of the task, a Rest screen will appear. Say,
Great job! Please wait while we set up the next session.

PAMret Scan Set-up:

- Highlight the PAMret scan in the Poldrack CNP protocol list and select the “<<” arrows to add it to current scan
- Double-click on the PAMret scan name once it is on the left
- Then right click the MBW scan above it, and select Copy Parameters
 - Click OK on the pop-up window (should be “Center of slice groups & Sat. regions”)
 - The yellow parameters should adjust
- Go to the BOLD tab and make sure that you are collecting the number of measurements that you want
- Click on the SCAN tab
- Coordinate with laptop/trigger
- Pause window will pop up, Click Continue when laptop/trigger is ready to start the scan

Directions for Scanning--PAMret:

- Clear all
- Go into the PAM_fixed /PAMret_fixed directory in Matlab.
- Start the **PAMret_timer** m-file
- Enter subject code.
- Enter input device for participant. **Keyboard, 932**
- Enter input device for experimenter. **Keyboard, Apple Internal Keyboard/Trackpad**
- Confirm that all information was input correctly.
- Start the task to bring up the instruction screen; let participants read the instructions while you read instructions verbatim to participant. Say,

In this next task, you'll be shown correctly and incorrectly paired words from the previous scan. You will be asked to judge how sure you are that the two words were paired during part 1. At the bottom, you will see a rating scale with four response options. Please be sure to use all four options from the rating scale to express how sure you are of your answer.

Press the first button if you are sure that the two words are a correct pairing. Press the second button if you think the two words might be a correct pairing. Press the third button if you think the words might be an incorrect pairing. Press the fourth button if you are sure that the words are an incorrect pairing.

Also, sometimes you will see just the words “sure correct,” “maybe correct,” “maybe incorrect,” or “sure incorrect” presented. On those trials, just press the button corresponding to that response option.

What the participants see on the screen:

You will now be shown correctly and incorrectly paired words.

You will be asked to judge how sure you are that the two words were paired together during Part 1 of this task

Please make sure to distribute your responses across all four levels.

Press:

1: Sure Correct

2: Maybe Correct

3: Maybe Incorrect

4: Sure Incorrect

Sometimes you will see just the words “Sure Correct”, “Maybe Correct”, “Maybe Incorrect”, and “Sure Incorrect” presented.

In that case, just press the corresponding button.

- With the instructions screen up, and the pause window up on the scanner console, press RETURN on the scanning computer while simultaneously pressing CONTINUE on the scanner console.
- MONITOR the participant to ensure that they are responding correctly and using the correct buttons. You can check the silver button box. If they are using the incorrect buttons, stop immediately, restart, and make a note of it.
- At the end of the task, a Goodbye screen will appear. Say, [Great job! Please wait while we set up the next task.](#)

SCAN: Resting State

Brief Description: In this portion, the participant will close their eyes and rest while scans are collected. They should continue to remain still and to not fall asleep.

Resting Scan Details

152 TRs

Materials:

Laptop

Task Running Time:

5 min

Total Run Time: 5 min 12 sec

Resting Scan Set-up:

- Highlight the Resting scan in the Poldrack CNP protocol list and select the “<<” arrows to add it to current scan
- Double-click on the Resting scan name once it is on the left
- Then right click the MBW scan above it, and select Copy Parameters
 - Click OK on the pop-up window (should be “Center of slice groups & Sat. regions”)
 - The yellow parameters should adjust
- Go to the BOLD tab and make sure that you are collecting the number of measurements that you want
- Click on the SCAN tab
- Coordinate with laptop/trigger
- Pause window will pop up, Click Continue when laptop/trigger is ready to start the scan

Directions for Scanning:

- Clear all
- Go into the tasks directory in Matlab and start the **black_screen** m-file.
- You do not need to enter an ID or anything else.
- Start the task to bring up the instruction screen; let participants read the instructions while you read instructions verbatim to participant. Say,

For the following part, you do not need to do anything other than keep your eyes open and remain relaxed. It is still important that you remain still and do not fall asleep, but you don't need to respond to anything. Any questions?

There are no on-screen instructions.

- MONITOR the participant.
- At the end of the task, a Goodbye screen will appear. Say,

Great job! Please wait while we set up the next task.

SCAN: Spatial Working Memory Capacity Tasks--SCAP

Brief Description: SCAP is a working memory task that tests the maintenance of spatial information over a delay. Participants are shown an array of 1, 3, 5, or 7 yellow target dots positioned pseudo-randomly around a central fixation. After a variable delay, participants are shown a single green probe dot and are asked to determine if the probe was in the same position as one of the target dots that were shown before the delay.

SCAP Scan Details

For the task, participants will complete 48 trials. There are 4 loads (1, 3, 5, or 7 dots), with 12 trials per load, and 3 delay durations, resulting in 4 trials per condition. Trial-blocks (target array (2 sec) + delay (1.5, 3, or 4.5 sec) + probe array (3 sec)) last 6.5, 8, or 9.5 sec, depending on the delay duration. ITI's take up 96 TRs total of the task, and range from 1-4 sec each with a mean of 2 sec. Jittered ITIs replace the need for null trials.

291 TRs

Materials:

Laptop

Button-box: left = blue button; right = yellow button

Task Running Time:

9 min 38 sec

Total Run Time: 9 min 50 sec

SCAP Scan Set-up:

- Highlight the SCAP scan in the Poldrack CNP protocol list and select the “<<” arrows to add it to current scan
- Double-click on the SCAP scan name once it is on the left
- Then right click the MBW scan above it, and select Copy Parameters
 - Click OK on the pop-up window (should be “Center of slice groups & Sat. regions”)
 - The yellow parameters should adjust
- Go to the BOLD tab and make sure that you are collecting the number of measurements that you want
- Click on the SCAN tab
- Coordinate with laptop/trigger
- Pause window will pop up, Click Continue when laptop/trigger is ready to start the scan

Directions for Scanning:

- Clear all
- Go into the SCAP directory in Matlab.
- Start the **SCAP_timer** m-file
- Enter subject code.
- Enter input device for participant. **Keyboard, 932**
- Enter input device for experimenter. **Keyboard, Apple Internal Keyboard/Trackpad**
- Confirm that all information was input correctly.
- Start the task to bring up the instruction screen; let participants read the instructions while you read instructions verbatim to participant. Say,

This task is the one where you have to remember the location of dots. First, you'll see yellow dots on the screen, and your job is to try and remember their locations because after a few seconds they disappear, and a green dot appears. Your job is to say whether the green dot is in the same place as any of the yellow dots, or in a different place. Press the first button if you think the green dot is in the same place as any of the yellow dots, and push the second button if you think the green dot is in a different place than any of the yellow dots. So again, that's button 1 if it's in the same place, and button 2 if it's in a different place.

Any questions?

What the participants see on the screen:

You will see either 1, 3, 5, or 7 yellow dots on the screen.

After these dots disappear, a green dot will appear.

Press the **FIRST** button if the green dot is in the same place as one of the yellow dots.

Press the **SECOND** button if the green dot is not in the same place as one of the yellow dots.

- With the instructions screen up, and the pause window up on the scanner console, press RETURN on the scanning computer while simultaneously pressing CONTINUE on the scanner console.
- MONITOR the participant to ensure that they are responding correctly and using the correct buttons. You can check the silver button box. Stop immediately if they are using the incorrect buttons and restart.

- At the end of the task, a Goodbye screen will appear. Say, **Great job! Please wait while we set up the next task.**

SCAN: Stop-Signal Task

Brief Description: The Stop-Signal Task measures response inhibition, or the ability to inhibit a motor response that has already been initiated. Participants see a series of arrows that point to either the left or right, and press a left or right button, respectively. On a subset of trials (25%), a stop signal (an auditory tone) occurs at a variable stop-signal delay (SSD) after the beginning of the stimulus presentation, signaling the participant to withhold his/her response on that trial.

Stop Signal Task Scan Details

Each Stop Signal session consists of 128 trials (75% Go trials). Each session includes two staircases, which represent the onset times for the stop-signal. For the first session, the starting ladder values are entered manually (and are taken from the pre-testing behavioral session). For the second session, the ladder values are taken automatically from the previous scan session.

The duration of events (Go, Stop, and Null trials, which include ITI) were created with opseek and varies between approximately 50 msec to 4 msec (with an average of about 1.5 sec).

184 TRs

Materials:

Stop-signal Task

*****THIS TASK HAS SOUND OUTPUT***:** the volume needs to be at a comfortable level.

*****THIS TASK REQUIRES LADDER VALUES FROM PRE-TESTING***.**

Button-box: left = blue button; right = yellow button

Task Running Time:

6 min 4 sec

Total Run Time: 6 min 16 sec

Stop-signal Scan Set-up:

- Highlight the Stop-signal scan in the Poldrack CNP protocol list and select the “<<<” arrows to add it to current scan
- Double-click on the Stop-signal scan name once it is on the left
- Then right click the MBW scan above it, and select Copy Parameters
 - Click OK on the pop-up window (should be “Center of slice groups & Sat. regions”)
 - The yellow parameters should adjust
- Go to the BOLD tab and make sure that you are collecting the number of measurements that you want
- Click on the SCAN tab
- Coordinate with laptop/trigger
- Pause window will pop up, Click Continue when laptop/trigger is ready to start the scan

Directions for Scanning:

- Clear all
- **Check sound if you have not done so already.**
- Go into the STOPSIG directory in Matlab and type ls in the command line to bring up a list of files in the directory. Select the name of the behavioral run from that subject (<sub#>stop_fmri1_<date>.mat) and copy it
- Start the **stopfmriOSX_2stairs_timer** m-file.
- Enter subject number.
- Enter scan number. **2**
- Are you scanning? 1 for yes, 0 for no: **1**
- Enter name of prior #stop_fmri1 to open: **paste in the .mat file from the behavioral run**
- Confirm that all information was input correctly.
- Start the task to bring up the instruction screen; let participants read the instructions while you read instructions verbatim to participant. Say,

The next task is the one where you have to press the button that corresponds to the direction the arrow is pointing. So press the first button if it's pointing left, and the second button if it's pointing right. You want to push the button fast, but sometimes, you'll hear a beep, and when you hear the beep you should try really hard to not push any button at all. It's equally important to try to go fast and to stop when you hear the beep, so if you're trying to stop every time it means you're going too slow. As long as you're stopping some of the time, though, it means you're doing a good job.

Any questions?

What the participants see on the screen:

Press the first button if you see the arrow pointing left.

Press the second button if you see the arrow pointing right.

Press the button as FAST as you can
when you see the arrow.

But if you hear a beep, try very hard to
STOP yourself from pressing the button.

Stopping and going are equally important.

- With the instructions screen up, and the pause window up on the scanner console, press RETURN on the scanning computer while simultaneously pressing CONTINUE on the scanner console.
- MONITOR the participant to ensure that they are responding correctly and using the correct buttons. You can check the silver button box. Stop immediately if they are using the incorrect buttons and restart.
- At the end of the task, a Rest screen will appear. Say,
Great job! Please wait while we set up the next session.

SCAN: Task Switching

Brief Description: In this task, the participant will see one of four images. They will be asked to make a response based on the cue above the image. They will either have to respond to the images' color or the shape. The task measures reaction time as the task changes from trial to trial.

Task Switching Scan Details

In the scan session, participants complete 96 trials.

208 TRs

Materials:

Laptop

Button-box: left = blue button; right = yellow button

Task Running Time:

6 min 52 sec

Total Run Time: 7 min 4 sec

Task Switching Scan Set-up:

- Highlight the Task Switching scan in the Poldrack CNP protocol list and select the "<<" arrows to add it to current scan
- Double-click on the Task Switching scan name once it is on the left
- Then right click the MBW scan above it, and select Copy Parameters
 - Click OK on the pop-up window (should be "Center of slice groups & Sat. regions")
 - The yellow parameters should adjust
- Go to the BOLD tab and make sure that you are collecting the number of measurements that you want
- Click on the SCAN tab
- Coordinate with laptop/trigger
- Pause window will pop up, Click Continue when laptop/trigger is ready to start the scan

Directions for Scanning:

- Clear all
- Go into the TASKSWITCH directory in Matlab.
- Start the **TASKSWITCH_timer** m-file
- Enter subject code.
- Enter stimuli order (1 or 2) – **taken from counterbalance log**
- Enter buttone order (1-4) – **taken from calendar**
- Enter input device for participant. **Keyboard, 932**
- Enter input device for experimenter. **Keyboard, Apple Internal Keyboard/Trackpad**
- Confirm that all information was input correctly.
- Start the task to bring up the instruction screen; let participants read the instructions while you read instructions verbatim to participant. Say,

Button order 1:

This task is the one where you have to respond to the color or the shape of images we show you on the screen as fast and as accurately as possible. At the top, you'll see a cue that tells you what to respond to. If the cue says "COLOR" or "C," you should respond to the color, and if it says "SHAPE" or "S" you should respond to the shape. When it says to respond to color, press the first button if it's red, and the second button if it's green. When it says to respond to shape, push the first button if it's a triangle, and the second button if it's a circle. Again, that's red for button 1 and green for button 2, and triangle for button 1 and circle for button 2. Any questions?

Button order 2:

This task is the one where you have to respond to the color or the shape of images we show you on the screen as fast and as accurately as possible. At the top, you'll see a cue that tells you what to respond to. If the cue says "COLOR" or "C," you should respond to the color, and if it says "SHAPE" or "S" you should respond to the shape. When it says to respond to color, press the first button if it's red, and the second button if it's green. When it says to respond to shape, push the first button if it's a circle, and the second button if it's a triangle. Again, that's red for button 1 and green for button 2, and circle for button 1 and triangle for button 2. Any questions?

Button order 3:

This task is the one where you have to respond to the color or the shape of images we show you on the screen as fast and as accurately as possible. At the top, you'll see a cue that tells you what to respond to. If the cue says "COLOR" or "C," you should respond to the color, and if it says "SHAPE" or "S" you should respond to the shape. When it says to respond to color, press the first button if it's green, and the second button if it's red. When it says to respond to shape, push the first button if it's a triangle, and the second button if it's a circle. Again, that's green for button 1 and red for button 2, and triangle for button 1 and circle for button 2. Any questions?

Button order 4:

This task is the one where you have to respond to the color or the shape of images we show you on the screen as fast and as accurately as possible. At the top, you'll see a cue that tells you what to respond to. If the cue says "COLOR" or "C," you should respond to the color, and if it says "SHAPE" or "S" you should respond to the shape. When it says to respond to color, press the first button if it's green, and the second button if it's red. When it says to respond to shape, push the first button if it's a circle, and the second button if it's a triangle. Again, that's green for button 1 and red for button 2, and circle for button 1 and triangle for button 2. Any questions?

What the participants see on the screen:

When cued with "S" or "Shape," respond to the shape of the image.

FIRST button = Circle

SECOND button = Triangle

When cued with "C" or "Color," respond to the color of the image.

FIRST button = Red

SECOND button = Green

Respond as quickly and as accurately as possible.

- With the instructions screen up, and the pause window up on the scanner console, press RETURN on the scanning computer while simultaneously pressing CONTINUE on the scanner console.
- MONITOR the participant to ensure that they are responding correctly and using the correct buttons. You can check the silver button box. Stop immediately if they are using the incorrect buttons and restart.
- At the end of the task, a Goodbye screen will appear. Say,

Great job! Please wait while we set up the next task.

Ending Scan Session

At the end of the last scan:

- Tell the subject that they are done and thank them. Let them know that the scanner bed will start moving out of the magnet.
- Click the scanner bed tab on the right of the console
- Click the "back home" button
- Go into the scanner room and help remove the subject

Scan Close-up

- Change the sheets for the scanner bed and pillow
- Put any sheet or blanket that was used into the appropriate bin.
- Put the goggles, button box, squeeze bulb, and headphones back in place.
- Place new earplugs on the bed
- Make sure that you have cleaned up!!

Laptop Close-up

- Unplug the black, USB, and headphones cord from the laptop and re-plug them into the scanner's laptop.
- Turn off the black box to the left.
- Turn off the white box on the shelf above.

Debriefing and Preparing for 2nd Session

- At the end of session 1, thank the participant for their participation.
- Let them know what to expect for session 2.

Session 2 will be very similar to today's session. On the next scheduled session, you'll meet us at the LA2K suite again and we'll go over the instructions for the tasks to be performed for that session. After walking over to the Brain Mapping Center, we will have another one hour scan session, where you will perform a different set of tasks.

Do you have any questions?

Post Scan Procedure

Uploading Data to LONI

All scan data should be uploaded to the LONI image data archive in the following manner:

1. Go to the LONI website and log in, at <https://ida.loni.ucla.edu/login.jsp>
2. Once in, make sure that the “Current Project” tab says CNP
3. Click on the button that says “archive files”
4. On the next page, click “single archive” or “batch archive.” Single archive lets you upload one scan at a time, and batch archive lets you set up multiple and have them all upload at once
5. On the “De-Identification” page, enter the following:
 - a. Select Data Type – Keep as “Original”
 - b. Research Group – Put in if it’s a control or patient, self explanatory
 - c. Visit: Choose A or B, depending on which scan visit you’re uploading (so, CNP_50000A would go in as visit A, etc).
 - d. Subject ID – Enter their subject ID WITHOUT the letter at the end. So, if you’re uploading CNP_50000A, you’d enter the subject ID as CNP_50000. This has to be uploaded in the format “CNP_#####” or it won’t work
 - e. Source Directory- this lets you choose the directory that contains the files to be uploaded. Note that these must be the raw files, in the dicom directory. Unless you are uploading to LONI directly from the FUNC lab, you will need to set up macfuse on your computer to mount the FUNC directories on your computer. Information on this software can be found at <http://code.google.com/p/macfuse/>. Once you are able to access the MRI data from your computer, you just point the source directory to that subject’s dicom directory (ie, .../space/raid2/data/poldrack/CNP/CONTROLS/CNP_50000A/dicom)
 - f. Target directory- this refers to a temporary directory on YOUR computer for LONI’s software to do it’s thing. I don’t think the files it makes are needed for anything, so you can use the same folder every time (even though it says it is going to overwrite the old files). But make sure you don’t overwrite files in a directory that has something important!
 - g. At the top right, there’s a box that says “Bypass Validation Steps.” You should click this, but if you forget to it’s not a big deal, you’ll just have to click continue a couple more times.
6. Let LONI’s web client do it’s thing, and once it finishes upload as many others as you’d like. If you chose “batch archive,” it will automatically ask you for the next ones.

Other LONI Things:

-To search through data that has been uploaded, go to the main menu and choose “simple query” or “advanced query.” From there, there’s a bunch of different search options

-“Project Summary” gives a handy look at what has been uploaded and downloaded from the website.

-For further information, check the “Documentation” tab at the top. This includes detailed instructions on what to do

Uploading Data to the FUNC

- Transfer scan data to func:
 - From a terminal on func enter the follow: `setup_subject CNP -b /space/raid2/data/poldrack/CNP/group/ -s CNP #####<scan letter>`
 - The four groups are: ADHD (7#####), BIPOLAR (6#####), CONTROLS (1#####), and SCHZ (5#####).
 - The two scan letters are A (MP-RAGE & DTI) & B (Resting and BHT).
 - Once the script starts it will ask you for a password for the data on dns0, that password is: endel5900
- Move all the behavioral data files from the task folders on the CNP laptop to their own subject folder. The folders are all in /Documents/Subject data/*group*/CNP #####
 - Make sure to get all the sst files, that should include and .mat, .log. and two st#####.mat files.
- Copy all the behavioral data files onto func.
 - Copy the subject folder onto the CNP thumb drive.
 - From your computer copy the behavioral files to the correct task folder within the subject behave folder.
 - Only the .mat file from the sst need copied
- Copy physio data onto func.
 - These files should have been emailed to you after the scan. If not they are on the BMC computer.
 - From your computer copy the physio files to the correct task folder within the subject’s physio folder for B scan on func.

Control Subject Consent

- After scan1 for control subjects enter consent into database: <https://www.npistat.org/htac/login.asp>
 - From the dropdown menu “Call Log” select “Process LA5C Control Consent”
 - Enter subjects LA2K subject number, if they consented and the date of consent
 - Indicate the subject’s choice on each of the three options.
- After entering consent it should be filed for Chelsea in the CNP office.

Completion

- After scan2 for control subjects enter complete date into database:
 - From the dropdown menu “Registry” select “LA2K Registry”
 - Find the subject’s number from the list and hit edit.
 - Change the subjects status to “complete”

Study Reporting

- Do study reporting for the scan at: <http://research.bmap.ucla.edu/>

Copies

- File copy of payment form and MRI screener and file in appropriate folders.

Participant Payment

Materials:

Safe

LA5C Project Participant Payment Receipt

General Directions:

- Payment is given to a participant after each scan session.
- Participants are paid \$15/hour for participation.
- If the participant is withdrawn or decides to discontinue their participation in the study, they are paid \$15/hr for the amount of time they put into the study.
- When it is time to pay a participant, hand them the LA5C Project Participant Payment Receipt.
- Ask the participant to complete the form.
- As the participant is completing the form, fill out the Payment Log recording the participant's ID, payment date, payment amount, current balance and your initials.
- Before the scan session, get the amount the participant is expected to receive. Always double or triple count the money to be sure you are giving the participant the correct amount. Place the money in an envelope.
- Give the participant the amount that they have earned at the end of the scan session. Hand the envelope to the participant and ask them to double check that it is the correct amount.
- Review the completed payment receipt to be sure all information was filled out and is legible.
- Thank the participant for his/her participation in the study and lead them out of the building if necessary.

Participant Release of Information – Images of Brain

Occasionally, participants will want to receive a portrait of their brain. To process this request simply have them sign the Release Form provided at the end of this manual.

- Indicate that they are giving permission for **CNP** to release the jpegs.
- Write in to whom the image will be going to (i.e. the subject's name, a family member, a friend, etc.)
- Indicate for what purpose; for this occasion, it's more than likely it will be for **general interest**.
- Indicate the consent time period.
- Sign under WITNESS, and have the participant sign under volunteer.

After this, *screenshot* the image of their brain, and have them specify the form they want to receive it: printed, email, etc.

Analysis and Output

Using Subversion

All of the scripts in the func under /space/raid2/data/poldrack/CNP/scripts are placed under version control using subversion. If used properly, this will create a history of all of the edits made to the files in this directory.

Using subversion:

-Before you edit a file, you should check to make sure that everything is up to date by typing 'svn status' within the scripts directory.

-If there are no pending changes, then this command should return without saying anything.

-If there are pending changes, you will see something like this:

```
poldrack::dentate:=>svn status
?   test_script.sh
M   DataTransfer.py
```

This indicates that the file test_script.sh has been newly added to the directory but has not yet been added to version control, and that the file DataTransfer.py has been modified since the last revision was committed.

-When you add a new file, you should add it to the repository using:

```
svn add test_script.sh
```

-After either adding or changing a file, once the changes are finalized (or if you just want to keep track of where you are in case you want to go back to it later), then you should commit the changes to the database by typing:

```
svn commit -m "put a message here about what you did"
```

(Within the quotes, after -m, you should put some explanatory text that describes what you did)

There is a lot more that you can do with subversion - for example, if you decide you need to go back to a previous version, or if you want

to duplicate the scripts directory somewhere else and keep the two versions in sync. But if you just do what I have listed above, we will be in good shape

Breath-Holding Task (BHT)

There is no output for this task.

The scans are analyzed...

Stop-Signal Task

Run the analyze program on the mat file: check the staircases and save the txt files.

Information stored in Seeker:

1. trial number (1-256)
2. num chunks
3. trial list (0 = Go; 1 = Stop; 2 = Null)
4. Arrow (0 = Left; 1 = Right; 2 = Null)
5. Staircase (staircase 1 or 2 for Stop trials; 0 for Go and Null trials)
6. Ladder-value (= SSD)
7. Subject's response (L or R button press; code depends on input device)
8. Ladder movement (-1 or +1)
9. Subject's reaction time (in ms)
10. Null
11. Null
12. Absolute time since the beginning of the task
13. Null
14. Actual SSD onset (in ms); should match column 6
15. Duration (1.5 for Go and Stop; varies for Null)
16. Timecourse (cumulative time in ms)

The analyze script to run is called "**final_quantile.**" The script will ask you to input the .mat file for the subject, as well as the portion of the run you would like analyzed.

This section is pending:

- To analyze the entire run, choose "1" and "16" as the first and last ladder steps.

- To analyze the second half of the run, choose "9" and "16" as the first and last ladder steps.

This script will output numbers to the screen in matlab, which should then be copied into an excel file.

Stop-signal behavioral variables:

Information output to screen when analyze program is run:

1. First step of the ladder analyzed (this is input by you when you run the script)
2. Last step of the ladder analyzed (this is input by you when you run the script)
3. Median reaction time for "go" trials
4. Reaction time for "go" trials (using quantile calculation)
5. Standard deviation of reaction time for "go" trials
6. Mean of Ladder 1 across trials
7. Mean of Ladder 2 across trials
8. Mean stop signal delay (the average of ladder means in #6 and #7)
9. Number of discrimination errors (for arrow direction)
10. Stop signal reaction time (assuming 50% inhibition)
11. Stop signal reaction time with quantile calculations (based on actual inhibition, not assuming 50%)
- 12. Percent inhibition for ladder 1**
- 13. Percent inhibition for ladder 2**
- 14. Percent go trials answered**

Behavioral data for Stop-signal should be checked for quality based on two parameters. First, **#12 and #13** should be checked to ensure that they average relatively close to 50% (meaning that they are inhibiting about half the time). Additionally, **#14** should be close to 1, as this indicates that they are actively attending to the task.

Criteria for determining subjects to exclude pending.

Stop-signal onset files:

To create the onset files for fMRI analyses, run a script on the behavioral .mat files called "**stopfmri_get_onsets.**" This script creates the following four output files:

1. run1_go_onsets.txt (onsets for the "go" trials that were answered correctly)
2. run1_succ_stop_onsets.txt (onsets for "stop" trials where the subject successfully inhibited their response)
3. run1_unsucc_stop_onsets.txt (onsets for "stop" trials where the subject failed to inhibit their response)
4. run2_junk_onsets.txt ("go" trials where the subject did not respond, or pressed the wrong button in response to the arrow)

The onset files each contain the following 3 columns for each trial:

column 1 = onset
column 2 = duration
column 3 = weight (which is always the same)

Stop-signal fMRI contrasts:

1. Go
2. StopInhibit
3. StopRespond
4. Go vs. StopInhibit
5. Go vs. StopRespond
6. StopInhibit vs. Go
7. StopInhibit vs. StopRespond
8. StopRespond vs. Go
9. StopRespond vs. StopInhibit

Balloon Analog Risk Task

Making onset files for image analysis simultaneously calculates output variables.

To make onset files, you need the **get_balloon_onsets_vn.m** program and the mat file.

First load the sub_final.mat file, then type get_balloon_onsets.

This will create performance output, which you should save in a separate file, and 4 text files.

BART behavioral variables: save this information

1. Balloon: 1 and 2 = Green; 3 = White
2. N(NoExp): number of no explode balloons per balloon type
3. E(expl): number of exploded balloons per balloon type
4. Nexpl: always 12, from explode_dist (which isn't relevant for this version)
5. Npress: mean number of presses per balloon type
6. Mean total: mean total amount earned per balloon type
7. Mean explode trial: mean number of trials for that balloon type before exploding

BART onset files:

In **trial_info.rt**, there are 3 columns:

- 1 = timestamp (balloon onset, which is cumulative in ms)
- 2 = rt (discrete in ms)
- 3 = timestamp (cumulative in ms)

get_balloon_onsets takes column 1 (balloon onsets) and puts those in the first column of the text file for each trial type (accept, reject, explode, null). This script creates the following four output files:

1. subjno_run1_accept_ons
2. subjno_run1_reject_ons
3. subjno_run1_explode_ons
4. subjno_run1_null_ons

The onset files each contain the following 3 columns for each trial:
column 1 = onset

column 2 = duration
column 3 = weight (which is always the same)

**Note that all durations are modeled as 3 sec, regardless of the actual onset duration.

**Note that no RT data is recorded in the performance output or text files now.

BART fMRI contrasts:

1. accept
2. reject
3. explode
4. control
5. accept vs. reject
6. accept vs. explode
7. accept vs. control
8. reject vs. accept
9. reject vs. explode
10. reject vs. control
11. explode vs. accept
12. explode vs. reject
13. explode vs. control
14. control vs. accept
15. control vs. reject
16. control vs. explode

Task Switching

Task Switching behavioral variables:

The variable “**rec_task**” in the .mat file contains the following information for each trial:

1. Trial Number
2. Text cue type
3. Shape and color cue type
4. Subject’s response
5. Subject’s reaction time (I think?)
6. Onset time of text (I think?)
7. Onset time of shape (I think?)
8. End time of trial (I think?)

Task Switching onset files:

Task Switching fMRI contrasts:

This section is incomplete pending input from Fred or Ajay.

Spatial Working Memory Capacity Tasks – SCAP

SCAP Input Files:

EFFICIENT_DESIGN.mat → SCAP_trialinfo →

→ *trialinfo*: [48x6 double]

Rows: 1 row per trial

Columns: 'condition' 'memload' 'encoding_dur' 'delay_dur' 'prob_dur' 'ITI'

→ *stimfiles*: {48x5 cell}

Rows: 1 row per trial

Columns: 'sdr' 'array stim png' 'probe stim png' 'load' 'answer'

Answer:

1=yes/same

2=no/different

→ *cond*: [1x48 double]

Columns: 1 column per trial, each cell is a digit 1-12

Conditions:

1=load 1, delay 1.5

2=load 1, delay 3

3=load 1, delay 4.5

4=load 3, delay 1.5

5=load 3, delay 3

6=load 3, delay 4.5

7=load 5, delay 1.5

8=load 5, delay 3

9=load 5, delay 4.5

10=load 7, delay 1.5

11=load 7, delay 3

12=load 7, delay 4.5

→ *desmtx*: [240x12 double] (design matrix)

SCAP Output File:

SCAP_<subject#>.mat (saved automatically in data dir)

→ *rec_task* [48x11 double]

Rows: 1 per trial

Columns: 'trial' 'cond' 'load' 'delay' 'correct' 'keypressed' 'RT' 'array_onset'
'delay_onset' 'probe_onset' 'probe_offset'

(For conditions, see list above)

SCAP behavioral variables:

1. Accuracy (overall, broken down by 12 conditions, and broken down by load and delay)
2. RT (overall, broken down by 12 conditions, and broken down by load and by delay)
3. Number of omissions (overall and broken down by 12 conditions)
4. Number of hits (overall and broken down by 12 conditions)
5. Number of false alarms (overall and broken down by 12 conditions)

SCAP onset files:

SCAP fMRI contrasts:

1. Each of the 12 conditions vs loadzero (fixation)
2. Each of the delays (averaged across loads) vs loadzero
3. Each of the loads (averaged across delays) vs loadzero
4. Delay 1.5 sec vs delay 3 sec
5. Delay 3 sec vs delay 4.5 sec

6. Delay 1.5 sec vs delay 4.5 sec
7. Load 1 vs load 3
8. Load 1 vs load 5
9. Load 1 vs load 7
10. Load 3 vs load 5
11. Load 3 vs load 7
12. Load 5 vs load 7

Paired Associates Memory Task (PAMenc & PAMret)

PAMenc Input Files:

PAMenc_stims.mat → stims (40x5)

Rows: 1 per encoding trial

Columns: 'leftword' 'rightword' 'leftimage' 'rightimage' 'correctresponse'

PAMenc_trialinfo.mat → trialinfo (58x4)

Rows: 1 per trial (includes encoding, null, and digit trials. Each block of 8 digits counts as 1 trial.)

Columns: 'timeofonset' 'condition' 'trialduration' 'ones'

Conditions:

0=null trial (2 sec dur)

1=enc_4sec (6 sec dur including ITI)

2=enc_6sec (8 sec dur including ITI)

3=block of control task (digits)

PAMenc Output File:

PAMenc_<subjectnumber>.mat → rec_task (86x4) (automatically saves to data dir)

Rows: 1 per trial (included encoding, null, and digit trials. Each individual digit is given a separate row.)

Columns: 'trial' 'trialtype' 'correctresponse_or_oddevennumber' 'subjectresponse'

'RT' 'ONSET_Target' 'ONSET_Probe'

Trial types (different key than conditions):

0=null trial

1=digit control

2=enc_4sec

3=enc_6sec

PAMenc behavioral variables:

1. Accuracy for all encoding trials
2. Accuracy for 4sec trials
3. Accuracy for 6sec trials
4. Number of omissions for 4sec trials
5. Number of omissions for 6sec trials
6. Number of omissions for all encoding trials
7. RT for 4sec trials (excluding omissions)
8. RT for 6sec trials (excluding omissions)
9. RT for all encoding trials (excluding omissions)
10. Number of hits for 4 sec trials and for 6 sec trials.
11. Number of false alarms for 4 sec trials and for 6 sec trials.
12. Number of omissions on control task
13. Percent correct on control task

PAMenc onset files:

PAMenc fMRI contrasts: (analyze the following both w/ and w/o omissions)

1. 6sec enc trials versus control task
 - a. trial type 3 vs trial type 1
2. 4sec enc trials versus control task
 - a. trial type 2 vs trial type 1
3. 6- and 4-sec enc trials versus control task
 - a. trial types 2 and 3 vs trial type 1
4. 6sec enc trials versus 4sec enc trials
 - a. trial type 3 vs trial type 2

5. 6- and 4-sec enc trials versus null
 - a. trial types 2 and 3 vs trial type 0
6. 4sec enc trials vs null
 - a. trial type 2 vs trial type 0
7. 6sec enc trials vs null
 - a. trial type 3 vs trial type 0

Also, sorted by subsequent accuracy in the retrieval phase:

8. Correct retrieval of paired word vs selection of incorrect paired word
 - a. trial type 1 or 2 if ret correct word vs Trial type 1 or 2 if ret incorrect word
9. Correct retrieval of paired word vs failure to recognize target word as 'old'
 - a. trial type 1 or 2 if ret correct word vs trial type 1 or 2 if ret selected 'new'
10. Selection of incorrect paired word vs failure to recognize word as 'old'
 - a. trial type 1 or 2 if ret incorrect word vs trial type 1 or 2 if ret selected 'new'

PAMret Input Files:

PAMret_stims.mat → stims_new (40x4) and stims_old (40x4)

There are separate files for the 40 'old' probes and the 40 foils.

Rows: 1 per foil trial

Columns: 'MAINWORD' 'leftword' 'rightword' 'correctresponse'

PAMret_trialinfo.mat → trialinfo (100x4)

Rows: 1 per trial (Control trial blocks count as one 16-sec trial.)

Columns: 'StimOnsetTime' 'ConditionNumber' 'TrialDuration' '1'

(Ignore 4th column; it's all ones)

Conditions:

- 1= 'rec_old'
- 2= 'rec_new'
- 3= 'arrow control'

PAMret Output File:

PAMret_<subjectnumber>.mat (128x6) (saves automatically to the data dir)

Rows: Each row is a trial (includes null trials, and each 2-sec arrow has its own row).

Columns: 'trial' 'trialtype' 'correctresponse' 'subjectresponse' 'RT' 'ONSET_Target'

Conditions:

- 1= 'rec_old'
- 2= 'rec_new'
- 3= 'arrow control'

PAMret behavioral variables:

1. Accuracy for 4 sec trials from enc
2. Accuracy for 6 sec trials from enc
3. Accuracy across all trials
4. Number of Remember trials
5. Number of Know trials
6. Number of Forget trials
7. Number of Correct Rejections trials
8. Number of False Alarm trials
9. Number of omissions for 4 sec trials from enc
10. Number of omissions for 6 sec trials from enc
11. Number of omissions for old words
12. Number of omissions for new words
13. RT for 4 sec trials from enc

14. RT for 6 sec trials from enc
15. RT for all trials
16. Number of omissions on control task
17. Percent correct on control task

Frequently Asked Questions

Clinical assessments

- 1) Are my responses on the questionnaires confidential?
- 2) Can I get feedback on how well I did on the questionnaires?

Cognitive Measures

- 1) Can I get feedback about how well I do on those "IQ" type tests?
- 2) Will you be able to tell my IQ from the tests?

Questions about the blood draw, DNA, and urine analysis

- 1) Does having my blood drawn hurt?

Your blood will be drawn by a licensed phlebotomist at the UCLA Medical Plaza. They are very good there and will do their best to make you feel comfortable.

- 2) What if I do not want to give a blood sample, e.g., frightened about needles?

The blood sample is a crucial component of the study, as our purpose is to examine how phenotypes (behavioral characteristics) relate to genotypes (genetic information). Unfortunately, if you do not agree to have your blood drawn we cannot have you participate in the study.

- 3) Do I still need to have my blood drawn if I do not agree to let researchers use my DNA?

Yes, the blood sample is a crucial component of the study, as our purpose is to examine how phenotypes (behavioral characteristics) relate to genotypes (genetic information). Unfortunately, if you do not agree to have your blood drawn we cannot have you participate in the study. If you do not want a cell line created from your DNA or do not want your DNA information shared with other research groups, that is fine. In that case, we will deliver your blood to the lab at UCLA to be analyzed and the sample will then be destroyed and data will only be available to this research study.

- 4) What will you do with the information if you find drugs in my urine?

We will log this information and use it as a covariate when analyzing the data of this study. A positive drug test does not exclude you from the study. Your results will not be disclosed to anyone and will only be coded by your ID #.

Can I still participate if...? Update with questions relevant for LA5C

- 1) I do some of the testing this week but then go out of the Country for 6 weeks?

Unfortunately, the study must be completed within 4 weeks. You can either complete the study before you go away or after you return from your trip.

- 2) I do not want to give a sample of my urine.

No, this is a part of the study and we do require a urine sample. We will log this information and use it as a covariate when analyzing the data of this study. A positive drug test does not exclude you from the study. Your results will not be disclosed to anyone and will only be coded by your ID #.

General questions

- 1) Can my relative [brother, sister, mother] participate?

Because it is a genetic study, we cannot include people who are blood relatives of our participants, but we certainly can include your friends or other relatives who are not directly related to you by blood.

- 2) Can someone I know [friend, girlfriend, wife] participate?

Yes, please feel free to pass along our number to any friends or non-blood related family.

- 3) Are you going to report my subject fee to the US government?

No, your fees for participation in this study will not be reported to anyone.

- 4) Do I need to report my subject fee to the US government?

No, your fees for participation in this study do not need to be reported to anyone.

5) What happens if I withdraw from the study?

You may withdraw from the study at any time. You will be paid \$15/hour for the amount of time you put into the study.

6) If I withdraw from the study, what will happen to my DNA?

You may withdraw from the study at any time. Your blood will either be sent to NIMH or analyzed at UCLA, based on how you answered these questions on the consent form.

Transportation

Driving & Parking Directions

Email address: la2k@ucla.edu

Logon ID: la2k

Password: phen0mics

(Sample email to send to participant)

Hi (enter participant's first name),

Thank you for volunteering to participate in the *LA2K* Project! We greatly appreciate your time and commitment to our study. Our office is in the **Semel Institute, on 760 Westwood Plaza** (also labeled as **740** on some signs). Please allow 15 extra minutes for parking. Here are directions, to see maps, please visit this website:

<http://www.healthcare.ucla.edu/ucla-medical/patient-guide/parking>

Driving Directions:

From the San Diego Freeway (405):

Take the Wilshire Blvd off ramp east. At the third traffic light, turn left (north) onto Westwood Blvd. Continue North on Westwood Blvd. (which turns into Westwood Plaza when on UCLA's Campus) and just past the new Ronald Reagan UCLA Medical Center will be a parking kiosk in the center median.

Inform the parking attendant that you are here for the LA2K study. The parking attendant will ask you for your first and last initial, give you a parking permit, and direct you to the proper parking lot.

If for any reason you have difficulty parking according to these directions please pay for parking out of pocket and get a receipt or parking stub so the study can reimburse you.

From the parking lot, walk through the 200 Medical Plaza Building to the ground level. Cross Westwood Blvd heading east to get to the Semel Institute. Walk north about 100 meters to the sliding glass doors in front of the Semel Institute. Walk through these doors, and turn right down the first corridor. Walk towards the end of the hall to **Corridor C9-700**. There is a sign that says, "LA2K Lab" on the door. Walk in this door and you will be helped by our receptionist.

From LAX:

Take the San Diego Freeway (405) northbound toward Santa Monica. Exit at Wilshire Blvd East. Turn left at Westwood Blvd. Continue North on Westwood Blvd. (which turns into Westwood Plaza when on UCLA's Campus) and just past the new Ronald Reagan UCLA Medical Center will be a parking kiosk in the center median.

Inform the parking attendant that you are here for the LA2K study. The parking attendant will ask you for your first and last initial, give you a parking permit, and direct you to the proper parking lot.

If for any reason you have difficulty parking according to these directions please pay for parking out of pocket and get a receipt or parking stub so the study can reimburse you.

From the parking lot, walk through the 200 Medical Plaza Building to the ground level. Cross Westwood Blvd heading east to get to the Semel Institute. Walk north about 100 meters to the sliding glass doors in front of the Semel Institute. Walk through these doors, and turn right down the first corridor. Walk towards the end of the hall to **Corridor C9-700**. There is a sign that says, "LA2K Lab" on the door. Walk in this door and you will be helped by our receptionist.

From the East via the 10 (Santa Monica Freeway):

Take 10 (Santa Monica Fwy) East to 405 (San Diego Fwy) North, and exit on Wilshire Blvd East. Turn left at Westwood Blvd. Continue North on Westwood Blvd. (which turns into Westwood Plaza when on UCLA's Campus) and just past the new Ronald Reagan UCLA Medical Center will be a parking kiosk in the center median.

Inform the parking attendant that you are here for the LA2K study. The parking attendant will ask you for your first and last initial, give you a parking permit, and direct you to the proper parking lot.

If for any reason you have difficulty parking according to these directions please pay for parking out of pocket and get a receipt or parking stub so the study can reimburse you.

From the parking lot, walk through the 200 Medical Plaza Building to the ground level. Cross Westwood Blvd heading east to get to the Semel Institute. Walk north about 100 meters to the sliding glass doors in front of the Semel Institute. Walk through these doors, and turn right down the first corridor. Walk towards the end of the hall to **Corridor C9-700**. There is a sign that says, "LA2K Lab" on the door. Walk in this door and you will be helped by our receptionist.

If you have any questions, don't hesitate to call us at: _____.

Thanks and we look forward to seeing you on (enter day, date and time) ex: Monday, 3/3 at 6:30pm.

Sincerely,

(your name here)

LA2K Public Transportation Directions

Culver CityBus (310) 559-8310 <http://www.culvercity.org/bus>

Line #6 LAX - Sepulveda Blvd - UCLA

Exit the bus at Westwood Plaza (in front of the Semel Institute). Walk north about 100 meters and go down a few steps to the sliding glass doors in front of the Semel Institute (740 Westwood). Walk through these doors, and turn right down the first corridor. Walk towards the end of the hall to **Corridor C9-700**. There is a sign that says, "LA2K Lab" on the door. Walk in this door and you will be helped by our receptionist. You will be reimbursed for your bus fare. Please save your receipt, if possible.

MTA (800) 266-6883 <http://www.metro.net>

Lines #2, 302, 21, 720, 761, 576

Exit at Westwood Blvd & Le Conte Blvd, SE corner. Cross Le Conte heading north towards the University campus. Continue north past the next street light and past the bike racks. Enter the Semel Institute through the sliding glass doors (740 Westwood). Turn right down the first corridor. Walk towards the end of the hall to **Corridor C9-700**. There is a sign that says, "LA2K Lab" on the door. Walk in this door and you will be helped by our receptionist. You will be reimbursed for your bus fare. Please save your receipt, if possible.

Santa Monica Big Blue Bus (310) 451-5444 <http://www.bigbluebus.com>

Line #1 Venice - Santa Monica Blvd – UCLA Conte
Line #2 Venice - Wilshire Blvd – UCLA
Line #3 LAX - Lincoln Blvd - Montana Ave - UCLA
Line #8 Ocean Park Blvd - UCLA
Line #12 Robertson Blvd - Palms - UCLA

Exit at Westwood Blvd & Le Conte Blvd, SE corner. Cross Le Conte heading north towards the University campus. Continue north past the next street light and past the bike racks. Enter the Semel Institute through the sliding glass doors (740 Westwood). Turn right down the first corridor. Walk towards the end of the hall to **Corridor C9-700**. You will be reimbursed for your bus fare. Please save your receipt, if possible. There is a sign that says, "LA2K Lab" on the door. Walk in this door and you will be helped by our receptionist.

Taxicabs

Beverly Hills Cab Company (310) 272-6611
Celebrity Red Top (310) 278-2500
LA Taxi (310) 204-4833
United Independent (213) 653-5050
Yellow Cab (310) 838-2121

Ask the cab driver to take you to the Semel Institute at 740 Westwood Plaza. The cab driver can drop you off right in front of the Semel Institute. Walk down a few stairs and through the sliding glass doors. Turn right down the first corridor. Walk towards the end of the hall to **Corridor C9-700**. There is a sign that says, "LA2K Lab" on the door. Walk in this door and you will be helped by our receptionist. You will be reimbursed for your cab fare. Please save your receipt.

Setting up a Parking Event

1. Contact a woman named Bri (Ext#: 51286) at the parking department. You can also ask to speak with Matt Enright.
2. Ask Bri to recharge the parking event for the "LA2K" using the recharge ID # NG77 (Fund # 441587-YM-31275)
3. The parking event should be called "LA2K".
4. It should be set up so that participants can be instructed to drive to the parking kiosk just North of Ronald Regan UCLA Medical Center on Westwood Plaza (located in the median just east of Parking Lot 8).
5. Once at the parking kiosk, participants will inform the parking attendant "I'm here for the LA2K study." Participants will be given a parking permit, and be directed to park in the Medical Plaza parking lot.

Information about fMRI

There are no known or foreseeable risks or side effects associated with conventional MRI procedures except to those people who have electrically, magnetically or mechanically activated implants (such as cardiac pacemakers) or to those who have clips on blood vessels in their brain. There are no known additional risks associated with high-speed MRI. Both the conventional and the high-speed MRI systems have been approved by the FDA and will be operated within the standards reviewed and accepted by the FDA.

A magnetic resonance scan is not uncomfortable. You will lie on a table that slides into a horizontal cylinder that is only slightly wider than your body. You will be asked to lie still, but you will easily be able to hear and speak to the research staff. The MR scanner makes loud knocking or beeping sounds during imaging; earplugs will be provided to help reduce this noise. There should not be any significant discomfort during this procedure. If you notice any discomfort you should notify the investigators as soon as possible. If the discomfort cannot be reduced to an acceptable level, the scanning session may be stopped. The MRI can be stopped at any time at your request. If you are prone to claustrophobia (fear of enclosed spaces) you may not participate in this study. If you are or might be pregnant, you may not participate in this study.

Some people find the physical confinement of the MRI bore uncomfortable. Confinement can result in anxiety or panic. If you are claustrophobic, you should not participate. You will hear sounds throughout the scan, and these sounds are a normal part of scanning. Also, mild apprehension in enclosed spaces is a normal reaction. However, if you feel increasingly anxious during the scan, you can stop the study.

A. Dimensions

You will be in a small space. You will be lying down on a table that slides into a larger tube. Your head will be covered with a plastic frame.

B. Noise

The scanning environment is loud. You will hear, at first, a loud clunking sound and, later, a high frequency noise that sounds like a loud repetitive beep.

C. Time

You will be in the scanner for approximately 1.5 hours. You will need to remain within the scanner, and as still as possible, throughout the duration of the scan. You will not be able to stop the session for a restroom break, unless you experience discomfort.

D. Remain As Still As Possible

It is absolutely critical that you remain as still as possible throughout the scan. Even the slightest motion can disrupt MR image quality and make the data unusable.

Important Documents