Brief Test of Adult Cognition by Telephone (BTACT) with Stop & Go Switch Task (SGST)

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MIDUS II Cognitive Test Battery Manual
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Brief Test of Adult Cognition by Telephone (BTACT)
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Form A

In this phone interview I will ask you to try and do some exercises that involve remembering and making judgments about words and numbers. Before we begin, I need to tell you a few things. Your participation is completely voluntary. If you prefer not to answer any question, just let me know and we will go on to the next question. The information that you give me will be confidential and used for statistical analysis only. It will be identified only by computer code and at no time will your name or other identifying information be attached to the survey results. Therefore, I won't be able to give any specific feedback.

These tasks are not harmful in any way. The exercises will take about 15 minutes. Do you have any questions about your participation is this study?

We will be tape recording the interview today so that we can score the exercises later. Do I have your permission to go ahead with this?

(If participant seems distracted, or there is noise or commotion in background such as young children, TV or radio, or other people talking, say "It is important that you are able to concentrate without being distracted while we do these exercises. Would it be better for me to call you back another time?" If so, make an appointment for another time.)

First I would like to make sure that you are able to hear me clearly. Please repeat these numbers after me: 2, 8, 3, 6, 9. ***(If not loud enough, ask person to speak up clearly.)*** Could you hear me clearly?

Now you will hear some words and numbers. Please do not use a paper and pencil for any of the questions. We suggest that you close your eyes while you are doing these to help you concentrate. Some of the questions will be easy for you, and some will be harder. We do not expect anyone to get all of these correct - just do the best you can.

WORD LIST RECALL (1.5 minutes on average)
Rey Auditory-Verbal Learning Test (Lezak, 1983)

I am going to read a list of words. Listen carefully. When I am finished, you are to repeat as many of the words as you can remember. It doesn't matter in what order you repeat them. Just try to remember as many as you can. I will say each word only one time, and I cannot repeat any words. You will have up to one and a half minutes, and I will not say anything until I tell you that your time is up. Do you have any questions? Are you ready?

(Read with one second interval between each word)

List of items not included.

Now tell me as many words as you can remember.

(Record words recalled ***correctly by entering the one or two letter code****, as well as repetitions of same word and intrusions).*

If person stops before 1 1/2 minutes is up, say, "There's still time left, can you think of any more?"

Good, now let's go on.

DIGITS BACKWARD (2.5 minutes)
WAIS III (1997) (copyrighted test)

I am going to say some strings of numbers, and when I am done I would like you to repeat them backwards, in the reverse order from which I said them. So if I said "3, 8", you would say "8, 3". Do you understand? The sets will get larger as we go.

Items not included.

Good, now let's go on.

CATEGORY FLUENCY (1.5 minutes)
Drachman & Leavitt (1972)

Now I am going to name a category and you will name things that belong in that category. Let's practice with the category "fruit". You could say peach, or pear. Can you think of any other fruits? (*wait for 2 correct items*). In a moment I will give you another category. When I say begin, you will name all the things from this **new** category you can think of, as fast as you can. You will have one minute to do this. I will let you know when your time is up. The new category is *not included here*. Do you have any questions? Ready?

Begin. ***(Time for one minute)***. If person stops before 1 minute is up, say "There's still more time, can you think of any more?"

Good, now let's go on.

STOP AND GO TASK (3-3.5 minutes)

Next I am going to see how quickly you can respond to the words RED and GREEN. Every time I say RED you will say STOP, and every time I say GREEN you will say GO. Try to be accurate, but respond as quickly as you can. So when I say RED you will say…
And when I say GREEN you will say…
Do you have any questions? Let's begin. This will last about 1 minute.

Trials not included here.

Good, now let's do something different.

NUMBER SERIES (2.5 minutes)
Salthouse & Prill (1987)

In the next exercise I will read you a series of numbers that may get larger or smaller in value. At the end you will try to figure out what the next number would be. So if the numbers were 2,4,6,8,10, the next number would be 12. After I say each number I will pause for as long as you need, and then you should say "okay" when you are ready for me to go on to the next number in the group. So if I said 2, you should say "okay" when you are ready for me to go on to the next number, then I say 4, you say okay, 6, okay, 8, okay, 10, and at the end I will ask you what you think the next number would be. In this case the next number would be 12, as each number has increased by 2.

Let's try one for practice: 35 (okay), 30 (okay), 25 (okay), 20 (okay), 15 (okay) **AND** the next number would be….???? (The answer should be 10 as each number has decreased by 5). There will be different patterns, and some of these will be harder than others, so just do the best you can. If you are not sure of the answer, it is okay to guess. Do you have any questions? *(Pause after each of the first 4 items for okay response; after the last item, say **AND** the next number is…?).*

Items not included here.

Good, let's move on.

30 SECONDS AND COUNTING TASK (30-SACT) (45 seconds)

Next, I would like to see how fast you can count You will have half a minute. Do you have any questions? I will let you know when the time is up.

Specific instructions not included.

Begin *(Time for 30 seconds)*
Record final number reached, and number of errors.

Good, now one more question.

WORD LIST RECALL II (40 seconds on average)

List of items not included.

Thank you very much for your help. We appreciate you taking the time to help us with this research project.

Guidelines for Administering and Scoring the Brief Test of Adult Cognition by Telephone (BTACT)

Patricia A. Tun & Margie E. Lachman
Brandeis University
February 9, 2006

Administration

1) General instructions for interviewers
   - please do not repeat any items in the exercises themselves (i.e. words from the word lists, digits, etc.)
   - if the subject does not understand the instructions the first time, and does not complete the practice successfully, repeat the instructions until he/she understands
   - please do not give specific feedback as to which items they got correct or incorrect
   - if the subject asks for repetition or feedback in the middle of a series, say "I am sorry, I can't repeat items (or can't say anymore) right now." Then at the end politely explain that the way the test is set up you are not able to give feedback.

2) General encouragement
   - if the person expresses concern about performance during the test, interviewer can say:
     - "Just do the best you can."
     - "Remember, we do not expect anyone to get all of these questions correct."
     - "Don't worry. We have deliberately made these questions challenging. If people could get them all right, we would not learn anything. We're trying to find which questions are harder than others."
   - In between tests, interviewer could say "Now let's try something different" to indicate a change of pace

3) Recording responses
   - Individual copies of the BTACT can be used by the interviewer for scoring while testing.
   - In addition, it is useful to record a sound file (or audio tape) of the interview in case one wishes to check responses for a subtest.
   - A computer sound file of the Stop and Go task is necessary for scoring latencies.

Handling responses and errors for subtests

The following sections spell out some details as to exactly what constitutes an error on the different subtests, based on our experience with the kind of situations that may arise. In each case we define the overall goal of the test, then describe some possible mistakes participants may make.

On all tests except the Stop and Go task, the primary interest is in accuracy - whether the participant can get the correct response. Therefore if he/she makes a mistake but immediately recognize the mistake and corrects it, we give them credit for being able to do the problem.

A) Word list: the goal is to recall words from the studied list.

- the interviewer checks off words recalled from the list on the script; repetitions can be checked twice, and intrusions written in
- credit is given if a noun is made plural (FARMERS instead of FARMER)
- An intrusion error is a word that was clearly not on the list (e.g. COWBOY instead of FARMER)
- Partial words are not correct (e.g. FARM instead of FARMER)
- A repetition is defined as a failure of self-monitoring. So if someone says DRUM, CURTAIN, BELL, DRUM, they are failing to remember they already said DRUM.
- Sometimes people use a thinking-out-loud strategy that is not a failure of self-monitoring: they might say "DRUM, CURTAIN, BELL…hmmm… DRUM, CURTAIN, BELL, HOUSE"… where they are running through the list again in their minds but are aware that they already said those words. Or they might say "DRUM, I already said DRUM", so we know that they know they are repeating. These situations do not count as repetitions.
- Sometimes we will need to depend on tone of voice: e.g. if someone says "DRUM, CURTAIN, BELL…. Did I say DRUM?" or sounds questioning. The key issue is whether they are aware that they have said the word already.
- In cases where the interviewer is unsure, it is best to note the case and listen to the sound file after the interview.

B) Digits backward: the goal is to repeat the numbers in the correct sequence.

- the interviewer checks off correct trials and notes incorrect trials with a 0
- when participant gets one trial correct at a level, move on to the next level. If the first trial is incorrect, give a second trial. Discontinue when no correct response is given at a level.
- please say all digits up to the last one in list intonation, then drop voice on the last one to indicate it is the end and S should respond
- if participant immediately self-corrects, do not count it as an error ("9, 6,..no, 9,2, 6")

C) Category fluency: the goal is for the participant to produce as many unique words as possible. The same criteria apply as for word list recall.

- the interviewer records all responses that are produced on separate lines on the response sheet. If desired, a temporal breakdown can be obtained by dividing the sheet into four sections and noting first responses produced in the first 15 seconds, then moving to the second section to record responses in the second 15 seconds; repeat for third and fourth sections.
- it may be necessary to check the sound file after the interview to determine repetitions

- we accept birds, fish, insects, etc. as animal names. Do not inform participants of this ahead of time, but if they specifically ask you if these are acceptable while they are naming items, say "yes, go ahead".
- If a participant says a category such as "bird", then names a specific, "robin", credit is given for each of these responses
- we do not accept mythical animals such as dragons and unicorns

D) Number series: the goal is to see if participants can detect the pattern in order to produce the correct number to complete the series
- the interviewer records the response given for each problem
- if participant immediately self-corrects and gets the right answer, give credit (e.g. "47… no, 48)
- to give a small breather after each trial, interviewer can say "Okay. Are you ready for another? The next set is…" after each trial.

E) 30 seconds and counting task: the goal is to see how far participants can get in counting back from 100 without omitting any numbers from the proper sequence.
- the interviewer records the last number reached, and also keeps track of the number of errors
- if a number is omitted entirely, it is an error (99, 98, 96….). Each number omitted counts as one error. So (99,98,95,94…) would be 2 numbers missed, 2 errors.
- Occasionally a participant will skip an entire decade of numbers: e.g. go from 91 to 80. This counts as 10 errors.
- Repeating the same number ("99, 98, 97, 97, 96") is also scored as an error; We are currently exploring the implications of another scoring option for repeats, i.e., to count them as correct. Note that repeats are already self-penalizing as repetitions reduce the number reached. We plan to compute two scores: one for number of errors and one for the actual number reached.

F) Stop and go task
- the interviewer records the first word the subject utters after each stimulus, by checking off accuracy on the test sheet.
- we are interested in the <u>speed</u> of the first response the participant produces
- allow a pause of one second between responses and the next stimulus, and between cues and stimuli (e.g. "Normal" ..."Green"))
- trials are scored as invalid if the subject produces extraneous noises such as coughs, comments, or there are other external distractions that would invalidate the latency
- if they give an incorrect response and then self-correct ("stop… no, go") we take the first thing they say as the response

- if they do not say the whole word, (e.g. “s-s-s….go) we count the first full word (go) as the response

Scoring

Word List Recall – Immediate & Delayed
Total number unique is total number of correct responses (range 0-15)
Total repetitions is total number of repetitions
Total intrustions is total number of intrusions

Digits backward
Score is highest number of digits reached (range 0, 2-8)

Category Fluency
Total number unique is total number of correct responses
Total repetitions is total number of repetitions
Total intrustions is total number of intrusions

(Can also be divided into quartiles by time to show temporal pattern)

Stop and Go task accuracy
Normal baseline score is total number correct in normal baseline condition (range 0-20)
Reverse baseline score is total number correct in reverse baseline condition (range 0-20)
Experimental score is total number correct in experimental condition (range 0-32)

- Switch trials score is total number of trials correct after switch in experimental condition (range 0-6) (Trials 4, 9, 15, 19, 24, 29 in experimental block)
- Noswitch trials score is total number of other experimental trials correct (range 0-23) (Trials 5-8, 10-14, 16-18, 20-23, 25-28, 30-32 in experimental block)
- Note that first 3 trials are a warm-up and are not included in switch or noswitch scores

Number Series
Total number of items correct (range 0-5)

30 Seconds and Counting task
Last number reached
Total number of errors
Total number of digits produced is calculated as:
100 – (number reached + number errors)

BTACT Stop and Go task: Options and Guidelines for Administration and Scoring

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The BTACT stop and go test should be recorded for later scoring of accuracy and latency measures. Although one could record the interview using many forms of sound media, including audio tape or digitized computer recording, the goal is to process the sound file using a system that will allow measurement of response latencies with the required degree of millisecond resolution. Various options open to researchers wishing to automate this process would include the use of voice recognition or sound recognition for recording responses, and specialized programs for scoring and analysis.

Administration

Presentation and scoring of the stop and go task occurs in three basic phases: stimulus presentation and recording, evaluation of the accuracy of the response, and evaluation of the latency (in milliseconds) of the response. There are a number of different options for administration and recording.

Stimulus Presentation Methods

The test can be administered by (a) a live interviewer or (b) in an automated fashion using a digit recording on a computer. We prefer the live interviewer method, especially for older adults. Older adults seem to feel more comfortable hearing a human voice and knowing they can ask a question or get reassurance. To keep timing precise, the interviewer can be prompted by a CATI system. For the automated administration, an interviewer can also be on the phone to intervene if necessary and to make note of invalid trials.

Recording Methods

The test can be (a) digitally recorded and manually scored for accuracy and latency later ,(b) scored by voice recognition technology which is trained to recognize the correct and incorrect answers and the onset of the response, (c), or recorded by a sound recognition program, which does not score the stimulus but does time the latencies from onset of stimulus to onset of response. We currently are using the first option.

a) Manual scoring of latencies (the method used in the MIDUS II Cognitive Battery):
   - Latencies are calculated manually from sound files and transferred to the database using an Iterative Sound Latency Processing Algorithm

- Human interviewers record the responses given by a subject online, and accuracy is scored by a computer data analysis program

b) Computerized latencies using voice recognition
- Voice recognition software determines response accuracy and latency
- Invalid trials could be flagged by an interviewer listening on the phone

c) Sound recognition and computerized latencies with interviewer accuracy input
- Software determines onsets of stimulus and response based on a criterion sound level, and calculates latencies for each trial
- Human interviewers record the responses given by a subject online, noting invalid trials, and accuracy is scored by computer

Advantages and disadvantages:

1) The manual method currently used in the MIDUS II is sensitive to extraneous noises, invalid trials, and participants who are old, speak softly, have accents, or are otherwise difficult to understand. However, the scoring of latencies by hand is labor-intensive.

2) A voice recognition program could, in theory, quickly produce latency scoring for a large number of files soon after testing. However, such a system would be efficient only to the extent that it could accurately score the difficult cases described above, including extraneous noises, less-than-optimal sound files, and a large number of older adults with varying regional accents. (These latter might be scored erroneously, or might require a second pass manual scoring.) An interviewer listening on the phone to the protocol could mark the trials that have problems and require further scrutiny. This would reduce the number of trials that would need checking manually.

3) Sound recognition with computerized scoring is a hybrid solution, which may combine the advantages of computerized scoring of trial latencies, with human intelligence applied online to record responses and invalid trials. This type of method, being more accurate than voice recognition, eliminating errors and the need for second pass scoring of difficult files, and speeding up the computation of latencies used in the manual method, might make it the most efficient choice in the long run.

Accuracy Scoring

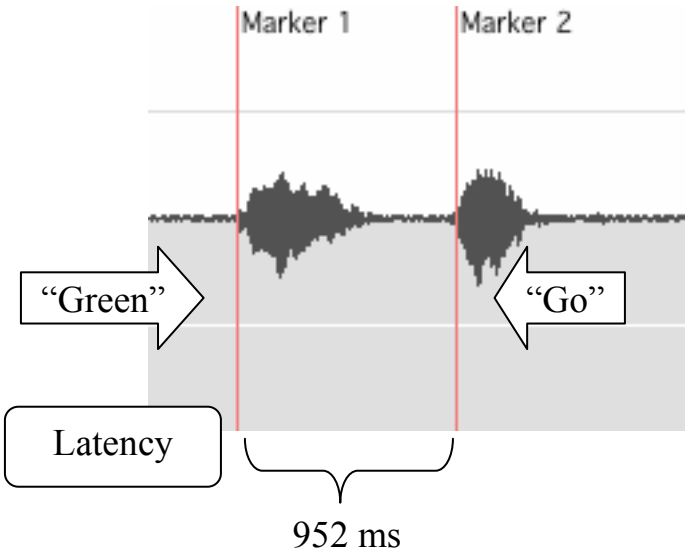
This is done by checking the number of errors. The percent of trials correct in each session should be above 80% to be considered a valid session. If an interviewer records correct vs. incorrect responses while on the telephone, these data can be entered into a data analysis program for scoring. More information about the different combination of scores that are useful

to compute can be found below in the section on data analysis and in the document, “Guidelines for Administering and Scoring the Brief Test of Adult Cognition by Telephone (BTACT).”

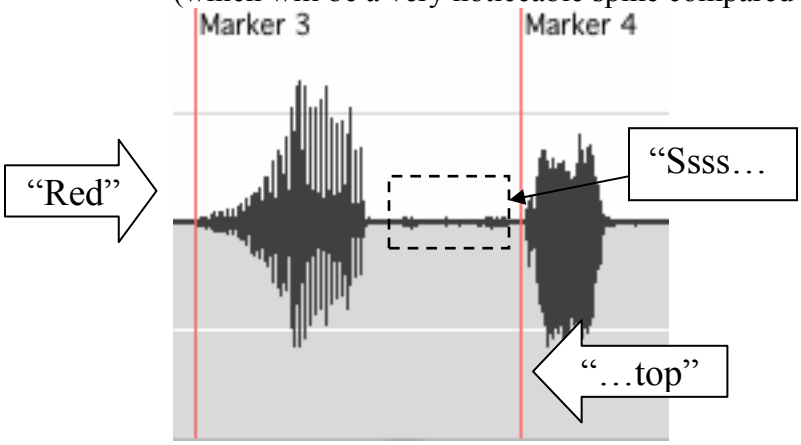
Instructions for Marking and Scoring Trial Latencies

The following scoring method is requires minimal equipment: a computer equipped with sound-editing software. The instructions provide a guide to marking and scoring latencies, as well as creating summary statistics from the trial data.

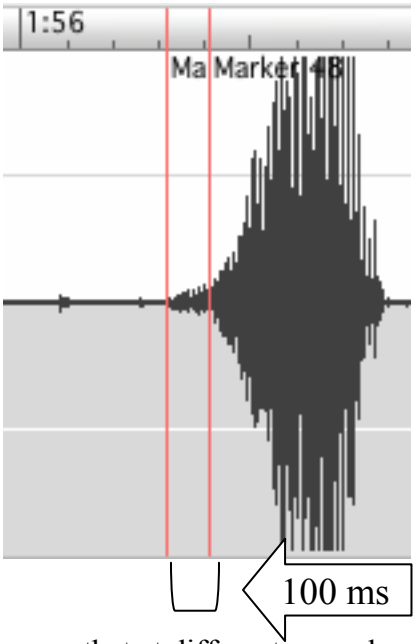
- Open the recording of the stop and go task in a sound-editing program (SoundStudio, SoundEdit, etc). If the recording is sampled as stereo (i.e., there are two audio tracks visible in the file), resample the file as mono.
- View the recording at the comfortable level of zoom for you, so that the details of the sound wave are clearly visible without being too detailed. (We frequently use 1:64). Make sure you have headphones on and the volume is set to a level comfortable to you.
- You will be using the Insert Marker function of your sound editor (in SoundStudio, this is accessed by pressing “M” at any point in the recording) to place markers that delineate the beginnings and ends of trials. For these we are only interested in **correct** trials.
    - Put your first marker at the onset of the experimenter's "red" or "green." Put your second marker at the onset of the subject's response ("stop" or "go"). You will need to pay more attention to the sound wave than what you hear, as the marker should always reflect the beginning of the change in the sound wave which corresponds to speech. Example:



- As "s" (in "stop") is a sibilant (a hissing sound), many participants will draw this sound out, often while they're still thinking about their response. As a result, you should set your marker at the onset of the "t" sound (which will be a very noticeable spike compared to the "s") . Example:



- If a trial is an incorrect or invalid response, put a first marker at the beginning of the experimenter's speech, and then another 100 ms later (or as close to it as you can get). (We call this an RSL for "really short latency"). This will mark an incorrect or invalid trial. Example:



Be aware that at different zoom levels, the distance between markers will look different.

- If the subject self-corrects, the first WHOLE WORD response is the one we will take (i.e., in a normal trial where the experimenter says "red," and the subject says something like, "go... no, stop," we would take their response as "go" and would count it as an incorrect trial). However, if a subject says something like "gggg.... stop," their response would be counted as "stop," as they did not completely utter the word "go."

    - Some trials may be invalid (for example, if a subject is interrupted, an experimenter gives a false cue, etc): in general, any trial where the time until the subject's response is no longer an accurate reflection of their reaction time will be an invalid trial.
    - You may need to go back and adjust the location of the markers, if they don't correctly reflect the location of the onset of speech (markers should be flush against the left edge of the beginning of the signal).
    - Generally, we do not mark the "warm-up" red/green experimental trials
- When saving the file, you will probably want to indicate that this file is in some way different from the original. Be sure to save the file as an .AIFF file, or another format that will save all the marker information. (.WAV will not).
- Check your work: listen to the marked sound file with a copy of the TACT in front of you, making sure that each error or invalid trials has a corresponding RSL. If you mark all trials (normal baseline, reverse baseline, and experimental; no warmup), there should be 144 markers when you are done. If there are not, it is likely that a marker was missed or an extra was placed somewhere.
- Once you have placed all markers and checked your work, it will remain to process the latencies, which are now indicated by the spaces between markers. In most sound editors, you will be able to find out the amount of time between two markers (in SoundStudio, by double-clicking between the two markers). Here, you are interested in the space between the ODD numbered markers (onset of stimulus) and the EVEN numbered markers (onset of response). The space between the even and odd markers can be ignored.
- Although it is easy to obtain this measure for one trial by hand, no doubt you will want to do this for every trial in the file. There are several ways in which you can simplify this process:
    - Most sound editors have a “split by markers” option. This will split the file into many different subfiles, delineated by the markers you have placed. If you do this, keep in mind that the only subfiles you will want to keep are the even-numbered ones, which correspond to the space between onset and offset. It is possible to process data from here by deleting all odd-numbered trials, opening up each remaining subfile in turn, measuring the total running time of the subfile, and pasting that number into an Excel spreadsheet, SPSS/SAS document, etc, being sure to delete or replace with invalid codes any trials with RSLs.
    - To somewhat simplify the above process, it is possible to automate the above process of deleting unnecessary subfiles, opening up each remaining file in turn, and pasting the time data into a spreadsheet.
    - There are numerous options for automating the process of scoring latencies including the use of scripting languages such as MatLab, Apple Script, VB Script, and WinBatch.

Data Analysis Guidelines

Data from individual stop and go trials can be processed in a number of different ways. Usually, they are conglomerated into composite variables of interest, such as a mean or median over all normal baseline trials, or over all experimental trials that include a switch. As reaction time data can often contain sizable outliers, usually it is recommended that this is dealt with in some way. In our lab, we do this by using medians instead of means for composite scores. Some may prefer to address this by converting raw scores to logs, or trimming the sample in some way. These guidelines assume that you have already decided how to process your raw scores, and are interested in how these composite scores are put together. We analyze latencies from valid, correct trials only.

Normal baseline trials are usually simply looked at across all trials, i.e., by taking a mean or median of the twenty trials that compose this condition. (Usually labeled nbase1 to nbase20). The same is true of **reverse baseline** (rbase1 to rbase20). It is also possible to conglomerate across all of these trials (base1 to base40). Sample variable names would be:

nbase: all normal baseline trials, #1 to #20
rbase: all reverse baseline trials, #1 to #20
allbase: all baseline trials, normal baseline #1 through reverse baseline #20

The 32 **experimental** trials can be broken down more finely. The measures of interest here are usually:

- **lag** (lag 1—the trial at the "reverse" or "normal" cue—lag 2, lag 3, lag 4, lag 5, and lag 6), i.e., the distance from the "reverse" or "normal" cue. Lag1 trials are usually called **switch** trials; lags 2 through 6 are usually designated **noswitch** trials.
- **cue:** whether this set of trials is a **normal** or **reverse**-cued set of trials

A point of consideration is that, in some composites, we do not include the first three trials (exp #1 to exp#3), because these are not rightly labeled "switch" or "noswitch" when the task is just beginning. We refer to these first three trials as **p trials**. If p trials are not included in a variable, this will be noted.

Some useful composite variables are:
allexp: All experimental trials, #1 to #32, collapsed across lag and cue.
allsw: All switch trials except p trials. Includes exp #4, #9, #15, #19, #24, and #29
allnosw: All noswitch trials except p trials. Includes exp #5 to #8, #10 to #14, #16 to #18, #20 to #23, #25 to 28, and #30 to #32.
rnosw: All reverse noswitch trials except p trials. Includes exp#5 to #8, #16 to #18, #25 to #28.
nnosw: All normal noswitch trials except p trials. Includes #10 to #14, #20 to #23, #30 to #32.
lag2: All lag 2 trials except p trials. Includes #5, #10, #16, #20, #25, and #30.

lag3: All lag 3 trials except p trials. Includes #6, #11, #17, #21, #26, and #31.
lag4: All lag 4 trials. Includes #7, #12, #18, #22, #27, and #32.
lag5: All lag 5. Includes #8, #13, #23, #28
lag6: All lag 6. There is only one lag6 trials, #14
rlag1: All reverse lag1 trials. Includes #4, #15, #24.
rlag2: Includes #5, #16, #25
rlag3: Includes #6, #17, #26
rlag4: Includes #7, #18, #27
rlag5: Includes #8, #19, #28
nlag1: All normal lag1 trials.Includes #9, #19, #29
nlag2: Includes #10, #20, #30
nlag3: Includes #11, #21, #31
nlag4: Includes #12, #22, #32
nlag5: Includes #13, #23
nlag6: Includes #14

Information about Recording and Administering
the BTACT and the Stop and Go Task

Recording audio:

There are many programs that can be used to record audio. The one we use here is called Audacity. This is available at http://audacity.sourceforge.net/ to download for free. I would recommend downloading the most recent non-beta version.

If you are using a computer that does not have a built-in microphone, there are many different ones available for purchase. A good one is the Labtec pc mic 333, which plugs into the microphone jack and can be mounted to a laptop (comes with adhesive and peel-off backing). It was about ten dollars when we purchased it from Amazon a couple years ago.

Administering the stop and go task:

The software we use to run the stop and go task is called DirectRT and is put out by Empirisoft. For information on this software visit the web site:
http://www.empirisoft.com/directrt.aspx
To see pricing and place your order, see the following link:
http://www.empirisoft.com/order.aspx

I can give you all the files that you will need to run the stop and go task once you purchase DirectRT. Here is how to arrange these files on the computer(s) you will use for testing: Create a folder (which you can place on the desktop or wherever is best for you) and name it stop and go task or whatever you like so that you will you will know what it is. Inside of this folder you will place the styles.drt file (this is the file that tells DirectRT what fonts and colors and such to use for the presentation) and the RedGreen version 3 with fixed response stimulus intervals.csv file (this is the file that runs the program.) Inside of this main folder you should create another folder named "Stim". The name of this folder has to be exactly that so that the DirectRT software knows where to access the stimuli. Inside of this Stim folder you should place all of the other files (the instructions test files, and the "red3" "green3" "normal2" and "reverse2" sound files). Then when you open up DirectRT and you want to run the task, click on the File menu and then click "Select and run input file." Browse your computer until you find the RedGreen version 3 with fixed response stimulus intervals.csv file, and select that one. Then when the little window pops up, enter your participant ID number and click OK and then you are off and running.

If you have any questions about this or have any trouble, feel free to call or email me (leea@brandeis.edu or 781.736.3245) and I will help you the best I can. For issues relating to problems with DirectRT, if I can't help you, they have a support form here: http://support.empirisoft.com/forumdisplay.php?f=3 or you can email service@empirisoft.com. My experience has been that it is quite slow getting a response, so make sure to test the program out long before you need to start running participants.

Automatic scoring of the stop and go task

We are able to do automatic presentation and scoring of the stop and go by using the software DirectRT in conjunction with a microphone attached to your computer and the speaker phone function of a land line telephone (we have stayed away from cell phones so far because there is a sometimes a minor to significant delay, which would affect reaction times). The software presents each pre-recorded "red" or "green" stimulus through the speakers of the computer. When the participant responds "stop" or "go," the computer microphone picks this up (assuming your voice response settings in DirectRT are adjusted properly[1]). The software automatically moves on to the next trial and plays the next stimulus word 1000 milliseconds after the onset of the participant's vocal response. Reaction times are recorded by the software and output into an Excel spreadsheet. This spreadsheet can be found in the Data folder of your project, and the reaction time is in the column labeled "RT." This represents the length of time from the end of the stimulus word "red" or "green" until the onset of the participant's vocal response. If one wishes to consider the reaction time from the beginning of the stimulus word, one must add 350 milliseconds to the RT in order account for the length of the "red" or "green" stimulus. These reaction times can be manipulated by using a macro or other similar procedure to put them in a format that can easily transferred to Excel or other statistical package.

[1] In DirectRT click on Tools>Voice Response Setup to test the sensitivity of your microphone and adjust to a level low enough that the participant will always be "heard" by the microphone, but not so low that breathing and other random noises will set it off.

BTACT Bibliography

Agrigoroaei, S., & Lachman, M. E. (2011). Cognitive functioning in midlife and old age: Combined effects of psychosocial and behavioral factors. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 66B(S1)*, i130–i140. doi:10.1093/geronb/gbr017

Lachman, M. E., Agrigoroaei, S., Murphy, C., & Tun, P. A. (2010). Frequent cognitive activity compensates for education differences in episodic memory. *American Journal of Geriatric Psychiatry, 18,* 4-10.

Lachman, M. E., & Tun, P. A. (2008). Cognitive testing in large-scale surveys: Assessment by telephone. In S. Hofer & D. Alwin (Eds.). *Handbook on Cognitive Aging: Interdisciplinary Perspectives* (pp. 506-522). Thousand Oaks, CA: SagePublishers.

Seeman, T. E., Miller-Martinez, D. M., Merkin, S. S., Lachman, M. E., Tun, P. A., & Karlamangla, A. S. (2011). Histories of social engagement and adult cognition: Midlife in the U.S. study. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 66B(S1)*, i141–i152. doi:10.1093/geronb/gbq091

Stawski, R. S., Almeida, D. M., Lachman, M. E., Tun, P. A., Rosnick, C. B., & Seeman, T. (2011). Associations between cognitive function and naturally occurring daily cortisol during middle adulthood: Timing is everything. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 66B(S1)*, i71–i81. doi:10.1093/geronb/gbq094

Stawski, R. S., Almeida, D. M., Lachman, M. E., Rosnick, D. B., & Tun, P. A. (2010). Fluid cognitive ability is associated with greater exposure and smaller reactions to daily stressors. *Psychology and Aging, 25,* 330-342.

Tun, P. A., & Lachman, M. E. (2006). Telephone assessment of cognitive function in adulthood: The Brief Test of Adult Cognition by Telephone (BTACT). *Age and Ageing,* 629-632. doi:10.1093/ageing/afl095

Tun, P. A., & Lachman, M. E. (2008). Age differences in reaction time and attention in a national telephone sample of adults: Education, sex, and task complexity matter. *Developmental Psychology, 44,* 1421-1429. PMCID: PMC2586814.

Tun, P. A., & Lachman, M. E. (2010). The association between computer use and cognition across adulthood: Use it so you won't lose it. *Psychology and Aging, 25,* 560-568.