Introduction to the NIH Toolbox

The National Institutes of Health (NIH) Toolbox initiative sought to assemble a set of brief, comprehensive assessment tools that would be useful to clinicians and researchers in a variety of settings, with a particular emphasis on measuring outcomes in longitudinal epidemiologic studies and prevention or intervention trials across the lifespan (ages 3–85). Such a battery ensures that assessment methods and results can be used for comparisons across existing, and later with completed, studies. The NIH Toolbox basic battery divides tests into four domains: Cognition, Motor, Emotion, and Sensation. In addition, within some domains, there are also supplemental measures that can be administered.

The Cognition Domain includes measures of:

Executive Function: is defined as the capacity to plan, organize and monitor the execution of behaviors that are strategically directed in a goal-oriented manner. The NIH Toolbox focuses on the following components of Executive Function: 1) set shifting, or the capacity for switching among multiple aspects of a strategy or task; and 2) inhibition of automatic response tendencies that may interfere with achieving a goal. Fluency, or the ability to utilize one or more strategies to rapidly generate specific exemplars of a response category, is often included in Executive Functioning tasks; however, the NIH Toolbox does not include a specific measure of fluency.

In the NIH Toolbox, the Flanker Inhibitory Control & Attention Test (Flanker) and the Dimensional Change Card Sort Test (DCCS) are measures tapping Executive Function.

Episodic Memory: refers to cognitive processes involved in the acquisition, storage and retrieval of new information. It involves conscious recollection of information learned within a context. The term "learning" refers to the acquisition of skills and knowledge, while the term "memory" refers to the persistence of this learning over time and/or the facility with which one is able to spontaneously recall the information following a delay. Episodic Memory can be verbal, as in remembering a conversation or a list of grocery items, or nonverbal, as in imagining a place one visited or a picture one saw a week before.

In the NIH Toolbox, the Picture Sequence Memory Test (PSM) is a measure tapping Episodic Memory.

As a supplemental measure, the NIH Toolbox includes a computerized version of the Rey Auditory Verbal Learning Test (RAVLT) called the NIH Toolbox Auditory Verbal Learning (Rey) Test.
**Working Memory:** refers to the ability to store information until the amount of information to be stored exceeds one’s capacity to hold that information. Usually, working memory refers to the capacity of an individual to: 1) process information across a series of tasks and modalities, 2) to hold the information in a short-term buffer, 3) to manipulate the information, and 4) to hold the products in the same short-term buffer. This concept updates the traditional construct of "short-term memory", which refers to a passive storage buffer, to include the notion of an active computational workspace. Working Memory overlaps with constructs of attention and Executive Function.

In the NIH Toolbox, the **List Sorting Working Memory Test** is a measure tapping Working Memory.

**Processing Speed:** is defined as either the amount of time it takes to process a set amount of information, or, conversely, the amount of information that can be processed within a certain unit of time. It is a measure that reflects mental efficiency. Processing Speed is central for many cognitive functions and domains, and is sensitive to change and/or disease.

In the NIH Toolbox, the **Pattern Comparison Processing Speed Test** and aspects of the Flanker test are measures tapping Processing Speed. As a supplemental measure, the NIH Toolbox includes a computerized version of the Oral Symbol Digit Test (**OSDT**) called the **NIH Toolbox Oral Symbol Digit Test**.

**Language/Reading:** refers to a set of mental processes that serve to translate thought into symbols (words, gestures) that can be shared among individuals for purposes of communication. The NIH Toolbox focuses on two aspects of language.

A. The first measure is the **NIH Toolbox Picture Vocabulary Test**, tapping receptive word knowledge that is fundamental to learning and that also has a very high association with overall intelligence (or what has been called the "g-factor").

B. The second measure is the **NIH Toolbox Oral Reading Recognition Test**, tapping oral reading skill that reflects level and quality of prior educational experiences. This measure provides a fairly robust indication of verbal intelligence that is relatively undisturbed by many medical conditions that affect the brain. Reading is defined as the cognitive process of deriving meaning from written or printed text. For the purposes of the Toolbox, the specific aspect of reading to be measured is the ability to pronounce single words out of context and to recognize and name letters.

**Attention:** refers to the allocation of one’s limited capacities to deal with an abundance of environmental stimulation and is the foundation for all other types of mental processes. There are several different forms of attention, including sustained, selective, and divided. Sustained attention is closely linked to the level of wakefulness or the maintenance of an alert state. Selective attention serves to direct sensory and thought processes to a particular stimulus or sector of the visual field so action can be taken. Divided attention is the ability to attend to more than one stimulus, spatial sector or modality simultaneously, and overlaps with Executive Function.
In the NIH Toolbox, aspects of the DCCS and Flanker Tests are used to measure Attention.

The Motor Domain includes measures of:

**Dexterity:** refers to the ability to coordinate the fingers and manipulate objects in a timely manner. In the NIH Toolbox, a 9-Hole Pegboard Dexterity Test is used as a measure of dexterity.

**Strength:** refers to the capacity of a muscle to produce the tension necessary for maintaining posture, initiating movement, or controlling movement during conditions of loading on the musculoskeletal system. More simply, muscle strength is the magnitude of force generated by an isolated muscle or a muscle group. This battery assesses only upper extremity muscle strength.

In the NIH Toolbox, the Grip Strength Test is used to assess upper body strength using a hand dynamometer.

**Balance:** refers to the ability to orient the body in space, maintain an upright posture under both static and dynamic conditions, and move and walk without falling. The ability to respond to internal and external disturbance, to realign body segments, as well as to protect oneself from falling is essential and inherent in everyday tasks.

In the NIH Toolbox, the Standing Balance Test is used to evaluate balance.

**Locomotion:** refers to the act of moving from one place to another place, reflecting ambulation ability including walking distance, velocity, and quality of gait over different environments and ground surfaces.

In the NIH Toolbox, the 4-Meter Walk Gait Speed is used as a measure of locomotion.

**Endurance:** refers to the ability to sustain effort that requires conjoint work capacities from cardiopulmonary, biomechanical and neuromuscular functions in the context of overall fitness.

In the NIH Toolbox, the 2-Minute Walk Endurance Test is used as the measure of endurance.

The Emotion Domain includes measures of:

Several sets of computer-administered questions that tap the following sub-domains:
The Sensation Domain includes assessments of several sub-domains:

**Pain:** refers to the unpleasant sensation and emotional experience associated with actual or potential tissue damage. In NIH Toolbox, two instruments are used to measure this construct; specifically, the Promis Pain Interference CAT and Pain Intensity make up the measurement of this construct. They are both self-administered, and instructions are presented on the computer screen for each. They are presented as one measure to the participant.

**Olfaction:** refers to the ability to detect odor sensation, to recognize odor quality, and to identify the source of the odor. Olfaction can be measured and quantified using a variety of techniques. This battery assesses olfaction only by identification ability and measures it by presenting individuals with a variety of odorants from everyday sources in strong concentrations and asking them to choose the correct odor from a set of possible names and pictures.

In the NIH Toolbox, the Odor Identification Test is used to measure olfaction.

**Vision:** is generally understood in terms of contrast sensitivity, visual acuity (high contrast sensitivity), and visual field operations. In this battery, only visual acuity is assessed. Here, it refers to the eye’s capacity to discriminate between different forms and aspects of an object (e.g., how big an object needs to be to be seen).
This measure is comprised of detection acuity (smallest object that can be detected), resolution acuity (smallest separation between objects that can be resolved), recognition acuity (smallest recognizable letter size that can be discriminated) and localization acuity (smallest spatial difference observed in adjacent lines).

In the NIH Toolbox, the Visual Acuity Test is used to measure vision.

As a supplemental measure, the NIH Toolbox includes a questionnaire that asks adult participants to respond to 53 items about their vision (aspects such as color vision; specific problems such as blurriness or headaches; under different conditions such as florescent lighting or night time; or while performing different activities). This measure is called the Vision-Related Quality of Life Survey (VRQoL).

**Vestibular Balance:** refers to the body’s ability to maintain balance and orientation in space while in motion. Vestibular functioning is maintained through an inertial guidance system that regulates balance and equilibrium, involving a complex multi-sensory interplay between the brain, spinal cord, eye and inner ear. A low-cost method, using electronystagmogram (ENG), was developed for this battery.

In the NIH Toolbox, vestibular balance is assessed by the Dynamic Visual Acuity Test (DVA).

**Audition:** involves both the physical processing of acoustic signals (e.g., intensity and frequency) and their psychological percepts (e.g., loudness and pitch). In the process of hearing, people detect, discriminate and localize a wide variety of stimuli, including linguistic sounds (e.g., speech syllables, words, sentences), and non-linguistic sounds (e.g., clicks, tones, music).

The NIH Toolbox includes an automated test of auditory sensitivity using pure tone signals that allows classification of the hearing of test participants as either normal or in terms of the degree and configuration of hearing loss.

In the NIH Toolbox, the Hearing Thresholds Test is used to measure audition.

The NIH Toolbox includes two supplemental measures in the Audition sub-domain. The first is a computer-based measure of speech (figure/ground) discrimination called Words in Noise Test. The second is a questionnaire, Hearing Handicap Inventory, that has slightly different versions for adults (ages 18-64) and the elderly (ages 65-85).

**Taste:** refers to the perception that arises from stimulation of taste receptors found most frequently on the tongue and throughout the oral cavity. This battery uses a measure of taste sensitivity that examines the experience of tasting salty and bitter solutions on the tip of the tongue as well as in the whole mouth.

In the NIH Toolbox, the Regional Taste Intensity Test is used to assess taste.
Test Development and Scoring in the NIH Toolbox

Several recent advances in test construction have been utilized in the development and scoring of the NIH Toolbox measures. Two of these, Item Response Theory (IRT) and Computer Adaptive Testing (CAT), are outlined below in simple terms.

All psychological/educational measurement or testing requires the concept of an underlying (latent) trait that can be expressed in terms of more or less. Traits are characteristics of a person and can include attitudes as well as knowledge or ability. We use test items to measure traits. To do this, test items are ordered from easy to hard and test takers can be ordered from less able to more able.

In classical test theory (CTT), an individual takes an assessment and his/her score on that assessment is used for comparison purposes. The higher the person scores, the higher he/she is on (has of) a trait; the lower a person scores, the lower he/she is on (has of) a trait.

In CTT, measurements are considered to consist of true scores plus an error score. Both the person to whom the item is administered and the item itself influence the probabilities that determine the make-up of a particular item response. It is impossible to separate or parse out the person’s contribution to an item score and the item difficulty.

In IRT, a trait is described as an unobservable dimension that is thought to give rise to a set of observed item responses. These traits are measured on a continuum with equal intervals; item calibrations are independent of the test-takers used for calibration. Test-takers and items are represented on the same scale: namely, item-difficulty = severity = measure = theta = item calibration = location and person-ability = measure = theta = person calibration = location.

In IRT, each individual item can be use for comparison purposes; persons who correctly endorse “hard items” are higher on (or have more of) that trait; persons who endorse “easy items” are lower on (or have less of) that trait. Items measuring the same construct can be aggregated into longer assessments.

In CTT, reliability is a single estimate and is based on the total test; a corresponding standard error of measurement exists, and the precision of measured reliability is known to vary at different ability levels. In contrast, in IRT, reliability is calculated for each person’s ability and varies across the continuum; typically, reliability is better at the middle of the distribution.

In CTT, validity is based upon the total test and needs reassessment if the instrument is modified in any way. In IRT, validity is assessed for the entire item bank and is conferred on any subset of the items used (short forms, CAT, etc.).
Knowing more about each item allows test creators to construct CATs that are shorter and more precise than traditional tests. Knowing a test-taker’s response to a given item, the test creator can then present the next item in a manner that targets the specific goal of the test. That is, if one is testing for a given trait, one can present the next item that represents more or less of that trait based on how the person responded to the previous item. Using this technique, the tester/researcher can give a minimal set of items that hones in on the trait being measured. There are no restrictions on the trait; it can be knowledge-based (such as reading) or attitudinal (such as anger).

From:
Hays et al: IRT & Health outcomes measurement in the 21st century
Gershon: IRT & CAT (assessment center training)
Introduction to Assessment Center

Introduction

Assessment Center is a free, online research management tool that allows a user to access a library of patient-reported and examiner-administered instruments. The instrument library includes measures from the Patient-Reported Outcomes Measurement Information System (PROMIS) and the NIH Toolbox.

Assessment Center also allows a user to set up a study-specific website to collect data from participants on library or custom instruments. Data can be exported at any time during accrual. Many other features are available, such as reviewing item and instrument statistics and previewing how a computerized adaptive test (CAT) is administered and scored. Refer to Help within the application (upper right corner hyperlink) or the Assessment Center User Manual for detailed instructions.

Note that Assessment Center works best using Internet Explorer. You can use Assessment Center on a mac computer, but not all of the NIH Toolbox instruments are compatible with macs. Refer to NIH Toolbox materials for more information.

Login and Studies

Assessment Center Homepage

The Assessment Center homepage (www.assessmentcenter.net) houses a number of useful resources including announcements, the Assessment Center User Manual, FAQs, and the customer service contact info.

Login

To work within the Assessment Center application, you must first register by creating a User ID and password and by providing contact information.

If you wish to utilize NIH Toolbox instruments and Assessment Center, you will need to register as a new user. To do this, navigate to www.assessmentcenter.net and click on the Register New User hyperlink in the upper right corner. You will also need to enter a study name. It is a good idea to use a study name like “[name]pilot” or “[name]practice” when learning the system. This will keep your true study name for data collection later. You must login at least once to complete the registration process. If you create a registration record but do not login, your name will not appear on the Assessment Center user list.
Studies

The first screen accessed upon logging into Assessment Center is in the Studies tab. All work within Assessment Center is organized within a study. You may have multiple studies, although study names must be unique within Assessment Center. You will see studies which you have created or studies in which you have been identified as a team member in the Study List. The list shows the most recently accessed study first and then all others alphabetically by study name. For our training, when you first login there will be a study that doesn’t contain any instruments or batteries yet (“ToolBoxPractice##”).

You may select any study from this list by clicking the hyperlink of the study name. We suggest flagging your study name with the word “practice” or “training.” Save your real study name for when it is time to collect data. If you don’t see the study name on the study List when you login, it is because another user already created a study with that name.

Create New Study

1. Click Create button to generate a blank Study Properties page
2. Complete Study Properties fields
3. Click Save button

If you want others to have access to your study (e.g., provide feedback on set-up, recruit participants, export data, use instruments you created), it is important to add them to your study team. To specify a study team, click on the Team hyperlink and select team members from the All Users list. You will want to determine each team member’s role on the study at the time of study creation, although team members may be added and removed or have roles changed at any time. New team members are automatically assigned the role of Associate. This role has read-only access to study elements. You will want to reassign roles to give appropriate permissions to your team members. To do so, a team member’s name should be selected, and then the Roles box that best suits each team members’ responsibilities should be checked.
Add a NIH Toolbox Battery to a Study

Navigate to the Instruments tab and you are on the Study Content page. The main purpose of this page is to display all the instruments within a study.

Search for Instruments

To add instruments to a study from the Assessment Center instrument library, click on the Add button. You will then be taken to the Add an Instrument page. Assessment Center houses instruments (e.g., a depression short form) and batteries (collections of instruments). NIH Toolbox has batteries for Emotion, Motor, Cognition, and Sensation on batteries for most of this workshop as these are the instruments experts feel provide the best assessment of patients.

On the Add an Instrument page, you will first need to decide if you want to search for instruments or batteries. Start by selecting Battery. The page will re-populate to show the available batteries. To view the content of a battery, click on the plus sign next to the battery’s name. This will display a list of the included instruments.

To pick a battery for inclusion in a study, check the box next to the battery name. You may select multiple batteries. After selections have been made, click on the Add to Study button at the top or at the bottom of the results list. You will receive a confirmation message that selections have been added to your study.

Pick a Battery for a Study

1. On the Study Detail page, click Add button
2. Select Battery
3. Select an NIH Toolbox study
4. Select an NIH Toolbox battery by checking box
5. Click Add to Study button

If all required batteries have been included, you may navigate back to the Study Content page using the “breadcrumbs.” Breadcrumbs are navigation tools (hyperlinks) located in the top left corner of the page.
Automatic Inclusion of Education and Handedness Instruments

All NIH Toolbox instruments were normed by level of education. Therefore, when any NIH Toolbox battery or instrument is added to your study, it will automatically include an education instrument. The education instrument MUST be administered prior to the NIH Toolbox instruments in order for the correct instrument administration and scoring to occur. For example, in language tests, education level determines where to begin the presentation of items. For children under the age of 18, a second education instrument about parental education is included. Parental education was used in norming for this age group.

Additionally, some instruments (Cognition, Motor) were normed for use of one’s dominant hand. Depending on the battery or instrument, a handedness instrument may be included automatically. This instrument includes a series of questions (e.g., what hand is used to write, to throw a ball) if the respondent doesn’t know the dominant hand. The handedness instrument should be administered prior to the NIH Toolbox instruments, so don’t move it to be later in the assessment. If you are selecting individual NIH Toolbox instruments rather than using an entire battery, you may need to include the education and handedness instruments where needed.

Enabling Data Collection in Spanish

Assessment Center allows a researcher to set up a study website to enable collection of participant data. This encompasses establishing study parameters (e.g., target sample size), defining assessments, and adding online consent forms. The Set-up tab is used when you have finalized instruments and are ready to set up a study-specific website for collecting participant data. When first navigating to the Set-up tab, please take notice of the sub-menu tabs immediately under the larger navigation tabs Language, Basic, Advanced, Consent, Registration. These sub-menu tabs can be used to navigate within the Set-up tab.

Language

The default page and first sub-menu tab is the Language page. This page allows you to select the language(s) in which your study will be administered to participants. You may select multiple languages. When multiple languages are selected, participants will be asked to select their preferred language at the beginning of each assessment. The Language page requires only one action; indicate which languages will be available to participants during data collection. The language options on this page are determined by the language setting on the Instrument Properties page and the language indicated when uploading translations on the Instrument Detail page.
Basic Set-up

The second sub-menu tab, Basic Set-Up, allows you to enter study information such as sample size and study web page address. On this page you are also asked to enter text and, if desired, an image which will appear on your study's homepage. It is important to review Basic Set-up default values. Most likely, these will need to be modified.

- **Start Date**: tells the system when to open for data collection.
- **End Date**: tells the system when to close data collection; default equals one year after the start date.
- **URL Extension**: unique portion of web address where participants will go to access the study; default equals study name, e.g., assessmentcenter.net/ac1/assessments/studynamen.
- **Close data collection when sample size equals**: data collection ends when the number of participants specified here have accessed the site; default equals 25.
- **Contact information for participant questions**: informs participants how to contact study staff; default equals study creator's email.
- **Login Screen Welcome Screen**: text participant sees when navigating to study-specific website; default equals “Welcome to” <Insert Study Name>.

Establishing Basic Study Parameters

1. Navigate to the Basic Set-Up sub-menu tab
2. Review default values in set-up fields
3. Modify set-up fields as necessary
4. Click Save
Setting up Multiple Timepoints

The third sub-menu tab, Advanced, allows you to set up a more complex data collection platform. Advanced Set-up should be used for studies that have multiple assessments or timepoints, multiple arms like intervention and control, or studies in which instruments should be administered in a random order. We will focus first on setting up multiple timepoints.

The Advanced Set-up defaults to having one arm and one assessment (timepoint). To add new arms or assessments, click on the New Row button.

- **Arm**: defines each study arm. A participant is assigned to only one arm (e.g., intervention or control). If you don’t have two study arms, make sure to use the same text in the arm field (e.g., “arm A”). One study arm should be entered per row, per assessment.

- **Assessment**: used to specify the assessment number of each arm entry. For example, a study with a baseline and one-month follow-up assessment has 2 assessments. One row should be numbered 1 and the second row should be numbered 2.

- **Day Assessment Opens**: designates when an assessment will be made available to study participants. An assessment opens a specified number of days after the first (baseline) assessment begins. This field is not applicable for the first assessment.

- **Window**: used to establish how many days an assessment will remain open to study participants.

<table>
<thead>
<tr>
<th>Establishing Additional Timepoints</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Navigate to the Advanced Set-Up sub-menu tab</td>
</tr>
<tr>
<td>2. Add another row(s)</td>
</tr>
<tr>
<td>3. Modify assessment number, day assessment opens and window defaults</td>
</tr>
<tr>
<td>4. Click Save</td>
</tr>
</tbody>
</table>

Add a Consent Form

Assessment Center enables a researcher to collect a total of three online consent forms. Participants can indicate consent through marking a checkbox and/or typing in his/her name. A view-only option is available as well. Consents can be made available in all languages selected on the Language sub-menu tab (e.g., English and Spanish).
Setting up Patient/Participant Registration

The fifth sub-menu tab, Registration, allows you to select which registration data fields should be administered to participants as part of self-registration and which registration information will be required. Registration items are presented to participants prior to the study instruments. Participant Registration is used to collect participant demographic and contact information. For NIH Toolbox instruments, age is collected here and used to tailor instruments (e.g., start adults with harder vocabulary items).

You may tailor the registration information collected within a study. The Registration page lists all available registration questions. You may select the registration questions most applicable to your study. You may also determine if each registration question will be required. Requiring an item will prevent a participant from moving on to the next item if a required question has not been answered.

You have the option of adding five custom registration questions. There is a custom field for a date response, two for a numeric response, one for a text response and one for a drop list. You may also add validation for Age. The values entered into the Min/Max fields will set the minimum and maximum values accepted.

Define Registration Fields

1. Navigate to the Registration sub-menu of the Set-up tab
2. Select additional registration questions to be included in study
3. Determine whether questions should be required and check Required box
4. Add Custom field labels, if applicable
5. Enter all Min/Max validation values, if applicable
6. Click Save
Preview and Launch

After study content and set-up parameters have been established, a study is ready for data collection. The Preview tab allows you to first preview your study as it would appear to participants, then finalize and launch the study for data collection.

Preview Study

Once a study is launched into data collection (Launch button is clicked on Launch page), study content and certain study parameters cannot be changed. Therefore, it is essential to review your study using the Preview feature prior to launch. The study should be previewed by all pertinent study team members to ensure all required changes are captured.

The Preview Study page allows you to see your study from the participant's viewpoint. First, you may opt to view response scores during preview. This is helpful in confirming the correct scoring for each response option is present. Participants won’t see the response scores once the study is launched. Next, you may export a study configuration report which details elements established on the Advanced Set-up tab. Definitions of study configuration report fields are available in the Assessment Center User Manual and online help. Finally, you may review study elements in the Study Set-up Summary on the Preview page.

To preview your study as a test participant, click on the Preview button. A window will appear noting the progress of the launch to preview. Once complete, you will be navigated to a preview data collection platform.

You must approve both the study configuration and preview prior to moving to the Launch tab. To approve, check the box in the Approve column. Your approval will be date stamped.

<table>
<thead>
<tr>
<th>Preview Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Navigate to the Preview tab</td>
</tr>
<tr>
<td>2. Select yes/no to viewing response scores (functional for patient-reported instruments)</td>
</tr>
<tr>
<td>3. Click Preview button</td>
</tr>
</tbody>
</table>
Launch Study

The Launch page is where a user deploys a study into the data collection phase. Once the Launch Study button is clicked, no changes may be made to the study content and most study set-up elements.

Prior to initiating data collection, click on the © to review and accept Terms & Conditions for any instruments you have included. Once this is done the Launch Study button will be enabled. After Launch Study has been clicked a launch progress pop-up will appear detailing the percentage of your study that has been launched to your data collection platform. A message will appear that includes the study hyperlink.

Data Collection Website

After you click the Launch Study button, the system will take a short amount of time to establish the website and data collection forms. You can view the study website by navigating to: www.assessmentcenter.net/ac1/assessments/<URL Extension>.

This web address (URL) can be given to study participants so that they may access the study website. If multiple languages were checked on the Language page, the first page a participant will see when navigating to your study website will ask them in which language they would like to complete the assessment. Otherwise, they will initially be navigated to your study homepage. The homepage of the website will welcome participants to the study with any text entered into the Welcome dialog box on Basic Set-up. Participants will be able to proceed by clicking on the Start button. If a participant has already begun the study, s/he may enter his/her login and password on the welcome page. S/he will be navigated to the next assigned assessment or the page where s/he stopped in the study instruments.

Study participants/patients will then see the consent form and registration questions. Next, an instruction screen will appear with the participant’s assigned login and password. Participants are advised to write these down so that they may access the study again if they do not finish the assessment in one sitting or if there is more than one assessment. The login which appears on this page is a randomly generated 5-digit number and the password is a randomly generated combination of three letters. If you wish to set a participant’s login and password, a researcher can register him/her through the researcher interface (see Assessment Center User Manual).
Administration - Accrual
The Administration tab helps manage study data and participants once a study is in the data collection phase. The default page on the Administration tab is the Study Overview page that provides accrual information and data exports.

Accrual Dashboard
The accrual dashboard allows the study team to quickly assess total accrual, complete cases and response rate.

Data Dictionary and Accrual Report
There are three group reports provided to every study. These reports are accessed by clicking on the report name hyperlink from the Study Overview page. They open as PDFs.

- Data Dictionary Report: lists all item IDs, item content, and response scores from your study.
- Enrollment Report: provides detailed information about current study accrual, count of completed, count of refusals, counts by gender, race and recruitment site.
- NIH Inclusion Enrollment Report: details accrual by cross-tabulating gender with race and ethnicity information. The format adheres to the requirements from the National Institutes of Health for periodic progress reports.

Administration - Exporting Data
Five data export options are available within the Administration tab. Data exports are made available once you click the Request button. Once the export is generated and available on the Study Overview page, an email will be sent to the email listed in email notification field above the Request buttons. After you receive the email, you may click the Download button. This will open a CSV file. This file can be opened in Excel or a statistical software package. Most computers with Microsoft Office will automatically open the file in Excel.

- Export Assessment Data: contains all of the raw data for the study including time/date stamps for all responses, number of seconds to respond, etc.
- Export Assessment Scores: contains instrument level scores for instruments in the Assessment Center library (e.g., T-Score for a PROMIS Fatigue short form). Custom instruments that are made by an individual researcher are not scored.
- Export Registration Data: contains all registration data for a particular study (e.g., race, gender, name).
- Export Registration Consent Data: contains information provided during consent form endorsement.
- Pivoted Assessment Data: contains all responses with each participant in a row and items in columns
The data exports for NIH Toolbox instruments are complex. You will see a raw score, a scale score, and typically a score that has been adjusted for age or age plus other demographics (“fully adjusted”). For some instruments, there are unique scores (e.g., score for dominant hand and non-dominant hand). To learn more about the scores, refer to the NIH Toolbox Scoring Manual on nihtoolbox.org.

Creating Practice Studies

Creating a number of practice studies is the best way to learn the features of Assessment Center. At this point, you have learned the basics of creating a study, selecting instruments, setting up the data collection URL, and managing accrual and data exports.

Assessment Center instruments are assigned to one of three access categories.

First, some instruments are publicly available to all Assessment Center users. These instruments are under the status “public” and can be viewed by selecting “All Public” on the Study name drop list on the Add an Instrument page. PROMIS is one collection of instruments that are publicly accessible.

Second, some instruments are available to Assessment Center users by special permission. The NIH Toolbox instruments fall into this category. In order to have access to these instruments, you need to be added to the list of approved individuals. You will need to complete the registration form on the NIH Toolbox website (www.nihtoolbox.org) to gain access.

Third, instruments that you create from scratch in Assessment Center (e.g., typing in new text by following the instructions outlined in Module 13: Creating a Custom Item in a Custom Instrument) are available only to you. You can add them to other studies you create. Other investigators that are part of your study team can also access these instruments. On the Add an Instrument page, select the study where the instrument was created to find a previously used custom instrument. More details are included in the section entitled: Re-using Custom Instruments.

Creating a Custom Item in a Custom Instrument

Create New Instrument

The main purpose of the Custom Instrument feature is to add instruments not in the Assessment Center library to your data collection site. This is often a demographics form, a clinical form, or perhaps another patient-reported outcome instrument like the FACIT-Fatigue. A custom instrument should be created if one wants to enter a published instrument not in the library or write new items. A custom instrument is only available to study team members. Once created, it can be added to team members’ other studies. You will first create the Custom Instrument and then create items to fill that instrument.
You may create a Custom Instrument from the Study Content page by clicking on the Create button. The first step in creating a custom instrument is to complete the Instrument Properties page. Once you have done this, you will be navigated back to the Study Content page. Here you can verify that your custom instrument has been created.

### Create an Instrument

1. In an un-launched study, on the Study Content page, click Create button
2. Provide an Instrument name (must be unique in Assessment Center).
3. Select Instrument Type (in almost all cases, Short Form)
4. Assign one or more Instrument Domains
5. Enter an Instrument Description
6. Click Save

### Create New Items

You can create new items within a custom instrument. To do so, on Study Content, click the hyperlink name of the instrument you just created. This will navigate you to Instrument Detail. Click the Create Item button. You will be navigated to Item Detail.

On the Item Detail page, you will need to enter a unique Item ID, context (if applicable – e.g., “In the past 7 days...”), stem (e.g., “I have been bothered by a lack of energy”) and scores/responses (e.g., 1 = Not at all, 2 = Somewhat). There are several response types you can choose from. Descriptions are in the Assessment Center User Manual.

<table>
<thead>
<tr>
<th>Multiple Choice (default)</th>
<th>Drop List</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checkbox List</td>
<td>Numeric</td>
<td>Informational</td>
</tr>
<tr>
<td>Date</td>
<td>Text</td>
<td></td>
</tr>
</tbody>
</table>

After you select response type, enter the score and response text for each response option. You may add an additional response option, where applicable, by clicking on the Add Another Row button within the Responses box.
Once an item is created, you may navigate back to the Instrument Detail page to proceed with study development or continue to create new items from the Item Detail page. To create additional items from an existing item, click the New or Copy button on the Item Detail page.

### Creating Items/Instruments for Researchers to Complete

You can use the same process of creating custom items in a custom short form to include information that a researcher or clinician would complete. This means that the short form is not seen by the participant. Instead, it can only be accessed from the researcher interface. A researcher can use this functionality to include a patient identification number that may be used in other systems. This will help link data between different databases. Another way this feature is used is to record scores from instruments administered on paper or elsewhere into the Assessment Center database. This allows a researcher to have all data on a participant stored in the same database. You will first create the items you want and then set up the instrument to only be seen by the researcher.

After you’ve created an instrument that is to be completed only by the researcher, you need to navigate to Study Set-up to indicate it is a clinician-completed instrument. Under the Set-up tab, navigate to Advanced. Click on Specify Instruments for each Arm/Assessment. You will see a “Completed by Participants” checkbox. By default, it is checked so that participants are presented the instrument. Simply uncheck the box for instruments that are completed by study staff. Data may be entered on the Participant Data page within the Administration tab.

### Create New Item for a Custom Instrument

1. On Study Content page, click on the instrument name hyperlink
2. On the Instrument Detail page, click Create Item button
3. Enter Item ID
4. Select Domain(s)
5. Enter context (if applicable) & stem
6. Select Response Type
7. Add additional response rows (if applicable)
8. Enter Response Score and Content (for multiple choice, checkbox list, drop list)
9. Click Save
10. Enter Item History comments (if desired)
11. Click Save on Item History dialog box
12. Add additional new items as needed
Entering Data from the Researcher Interface

The Administration tab allows for a researcher with appropriate permission to review and enter participant-level data. For example, a study team member may want to add a participant’s ID used in another system or add a score from an instrument completed elsewhere. This is done on the Participant Data page. The Participant Data page is NOT intended for participant self-report or researcher interview. The instrument administration engines and customization (templates, branching, randomization) are NOT integrated into the Participant Data page.

The Participant Data page displays a list of all applicable assessments on the left panel of the page. Clicking on the name of the assessment will expand the list to show all of that assessment’s instruments. The text color indicates where a participant is within the study schedule. Assessments that are listed in red occurred in the past, i.e. the participant is no longer in the defined assessment window. Assessments that are listed in green are currently open. Assessments that are listed in black occur in the future and are not currently available. If a line is crossing off an instrument, the participant viewed all items within that instrument. This could mean that a participant completed the instrument, or viewed each item but chose to skip it without answering.

To review or enter participant data for a particular assessment and questionnaire, click on the applicable assessment, then the instrument name. This action will open the questionnaire in the main panel of the page. You can use the scroll bar on the right to navigate to see every item in the instrument. If you are entering data using these screens, be sure to click on the Save button before moving on to the next instrument. To be able to view the Participant Data page, staff must have the Study Administrator or Study Participant Administrator. To be able to modify participant data, staff must have the Study Data Entry Administrator role.

Establish Instrument Completed by Researcher

1. Navigate to Advanced Set-up. Click on Specify Details for a given Arm/Assessment
2. Uncheck Completed by Participant for the clinician-completed instruments
3. Click save

Researcher Data Entry

1. Access a launched study
2. Navigate to Administration
3. Click on Participant list and select a participant (click hyperlink)
4. Navigate to Participant Data sub-menu tab
5. Select desired assessment and instrument on the left
6. Complete data entry for clinician-completed instrument
7. Click Save
Re-Using Custom Instruments

Once you have created a custom instrument and launched that study, you can add that same instrument to other studies. To add the instrument to an un-launched study, navigate to the Instruments tab. Click the Add button. Use the Study field to search for other studies where you created instruments. Click Show Results to re-populate the page with search results. Only those instruments that have been administered or are available to the public will be included in search results.

Note that all NIH Toolbox instruments are only available to those who have permission. In order to gain permission, complete the registration process at nihtoolbox.org. After providing brief information, you will be granted access.

Building your own NIH Toolbox Assessment Rather than Using a Battery

Toolbox investigators created batteries for Emotion, Cognition, Motor, and Sensation to provide a comprehensive assessment in a given area. At times, a clinician or investigator may wish to create a custom Toolbox assessment that does not match the content of a battery. You can do this within Assessment Center through adding individual instruments to a study. Start in an un-launched study. Navigate to the Instruments tab and click Add. Instead of selecting Battery, select Instrument. You can then use the search criteria on the Add an Instrument page to find instruments within a Toolbox study (NIH Toolbox Emotion, NIH Toolbox Cognition, NIH Toolbox Motor, NIH Toolbox Sensation) or within a given domain.

As noted before, all NIH Toolbox instruments require that the NIH Toolbox education instrument is included. Additionally, some instruments require the inclusion of the handedness instrument in order to be administered and scored correctly. When you are building your NIH Toolbox assessment rather than using a battery, you must include the required education and handedness instruments. They should be administered first so that Assessment Center knows where to start a given instrument (e.g., begin with appropriate level of vocabulary word).

Creating a Custom Toolbox Assessment

1. In an un-launched study, navigate to Instruments and click Add
2. Select Instrument (rather than Battery)
3. Use the search criteria on the page to search for Study=Toolbox or the desired domain
4. Click Show Results
5. Check the box next to the desired instrument names and click Add to Study
6. Navigate back to Study Content using breadcrumbs at the top of the page
Tailoring Assessment Content by Timepoint

Some studies may wish to have different instruments included at different timepoints. For example, demographics are likely not needed at follow-up assessments. This feature is included on the Advanced Set-up tab.

From the Set-up Tab, navigate to Advanced. Previously in the section entitled: Setting up multiple timepoints, you learned how to establish multiple timepoints and study arms using this page. The Specify Instruments hyperlink will navigate you to the Arm/Assessment Details page. This page allows control over what instruments are included in a given timepoint, their order, and who should complete them. The Arm/Assessment Details page should be completed for each arm/assessment combination.

- **Instrument Block**: used to group instruments together or to indicate the instrument will not be included in an assessment. The default equals one. Instruments in the same block are presented together.
- **Block Administration**: used to designate whether a block of instruments should be administered in a fixed or random order. The default is fixed.
- **Instrument**: a label which provides the name of each instrument in the study.
- **Order within Block**: designates how instruments within a block will be administered to participants. The default is sequential ordering within the block.
- **Completed by Participant**: used to indicate whether an instrument should be administered to a participant. The default is checked, meaning that the instrument should be administered to a participant. Unchecking will make it available only through the researcher interface for data entry.
- **Administer**: used to reduce duplication between study instruments. This is most often used when instruments within the same domain are administered in the same study (e.g., Anxiety CAT and Anxiety short form).

Tailoring Assessment Content by Timepoint

1. Navigate to Set-up/Advanced
2. Click on Specify Instrument hyperlink for selected assessment
3. Determine whether each instrument should be included in this assessment
4. Click Save

Researcher Registration of a Participant

When a participant goes to a launched study URL and completes the registration fields, this is called Participant Registration or Self-Registration. When this happens, Assessment Center generates a five digit login for that participant. Sometimes, however, a researcher may want to register a participant through the researcher interface of Assessment Center, not the launched study URL. This would be done if a researcher wants to select the login/password (e.g., to match a login/PIN used in another database), force an assignment to a specific study arm, or track who receives a given login when the study is not able to collect identifying information in Assessment Center.
To have a researcher register a participant, you need to create a new registration record. To do this, navigate to the Administration tab for a launched study. Click the Find/Search button. On the Registration Details page, check the box “Create participant login” and enter the login along with password. Set Consent = Yes. Click on the Participant Details submenu tab. Complete all of the required registration fields. Remember that NIH Toolbox requires that you provide age, race, ethnicity and gender. Access Contact Information and Custom Fields submenu tabs if registration fields on those pages are required. When you have entered the last piece of information, click the “Register Participant” button at the bottom of the screen. The login will appear at the top of the registration page in bold blue text.

When generating a participant login, you will have the option of creating a participant’s login or having the system assign a login. If the system assigns the login, it will be a random 5 digit number. If you opt to create the login, you will need to first check the create participant login box and enter an alphanumeric login 5-10 characters long.

<table>
<thead>
<tr>
<th>Researcher Registration of a Participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. In a launched study, navigate to Administration</td>
</tr>
<tr>
<td>2. Click on Find/Create Login</td>
</tr>
<tr>
<td>3. Check the “Create participant login” box. Enter all required fields on Registration Details.</td>
</tr>
<tr>
<td>4. Navigate to Participant Details sub-menu tab</td>
</tr>
<tr>
<td>5. Complete all required fields</td>
</tr>
<tr>
<td>6. Navigate to Contact Information and Custom Fields if needed and complete all registration fields</td>
</tr>
<tr>
<td>7. Click Register Participant button at bottom of page</td>
</tr>
<tr>
<td>8. See confirmed Login in blue in the upper right of the screen</td>
</tr>
</tbody>
</table>

**Marking a Participant as Practice (“Test”)**

In order to learn how to administer NIH Toolbox instruments, it is strongly recommended that you practice prior to working with a patient/participant. It is easiest to do this in the study you plan on using for actual data collection. However, you don’t want your practice data to be included in the dataset you will later use for analyses. Therefore, you will need to flag these logins as practice or “test” participants. In a launched study, navigate to the Administration tab. On the Overview page, click on the Participant List button. Click on the hyperlink next to the test participant’s login and password. If you collected name in Registration, the hyperlink will be the participant’s name. If not, it will be “zzzMissingMissing”. You are navigated to the Participant Details page. Consent status should be changed from “Yes” to “Test.” Click Register Participant to save the change. In all data exports, you will want to only analyze those participants who have a 1 in the Consent field. Other values (2= No consent, 3 = test participant, 4 = preview participant) are not suitable for analyses. It is therefore important when you are practicing to record the logins that are generated so that you can return to change the consent status.
Helpful Resources

Help

Assessment Center includes a Help feature at the top right of each screen that can be accessed at any time. You can use this hyperlink to access an index of Assessment Center information. The organization of Help parallels that of Assessment Center. Help includes definitions, explanations of how to complete particular tasks, tips, and additional useful information. Help opens into a second window to allow the user’s work not to be disturbed while seeking additional information.

Assessment Center User Manual

An extensive user manual with step-by-step instructions on utilizing all features of Assessment Center is available for download on the Assessment Center homepage (www.assessmentcenter.net). Click on the User Manuals hyperlink to open a PDF.

Assessment Center Online Video Tutorials

A series of video tutorials were created to review material covered in this training. You can access and view these by clicking on the Video Tutorial hyperlink on the left side of the www.assessmentcenter.net homepage.

NIH Toolbox e-Learning Modules

There are also e-learning Modules and NIH Toolbox training videos on the nihtoolbox.org website.

NIH Toolbox Training Manual

A training manual that helps you learn the correct administration of the NIH Toolbox is on the nihtoolbox.org website.

Marking a Participant as Practice (“Test”)

1. In a launched study, navigate to Administration
2. Click on Participant List
3. Click on the hyperlink next to the desired login
4. Change the Consent status from Yes to Test
5. Click Register Participant button at bottom of page to record change.
6. In data exports, sort to only include consent=1 participants
Accessing NIH Toolbox After Training
Complete the registration form on the nihtoolbox.org website to gain access to NIH Toolbox instruments.

Assessment Center Help Desk
Assessment Center has a help desk that can be accessed Mon-Fri 9am-5pm CST. Email help@assessmentcenter.net or call the help line at 877-283-0596.
Introduction to Computer and Special Equipment

Hardware and Software Setup

Before beginning:

Have your laptop and monitor ready. Laptops must have Windows 7 and either IE 8.0 or IE 9.0 (32-bit) installed, have 4 USB ports, and support a screen resolution of at least 1366 x 768. External monitors must measure 19" and support a screen resolution of 1440 x 900. An Adobe Flash player is required for many of the cognition instruments. The Internet Explorer browser that is open on the external monitor must be set to full screen.

NIH Toolbox instruments have been optimized to run and are supported on Windows 7 and Internet Explorer 11.

Have a multi plug power strip ready to accommodate the power cords and chargers.

Have the necessary Toolbox equipment close at hand.

Laptop and Monitor Setup for NIH Toolbox Cognition and Sensory Instruments:

The Cognition and Sensory measures are designed to be administered in dual-screen mode so the examiner controls start of test, skipping a test (when the participant is ineligible or unwilling to take a measure), stopping a test (if the participant refuses to continue), and in some cases, scoring. The laptop is used by the examiner and the external monitor is used by the participant.

It is essential that you set up your laptop and monitors properly. If resolution on primary monitor is incorrect you will have difficulty administering the Toolbox.

Set up the monitor to the left of the laptop at slightly more than a 90-degree angle. Plug in the three laptop-to-monitor cables:

1. Laptop power cord;
2. External monitor power cord; and
3. Monitor VGA cable (the one provided with monitor). If vision measures are not given, 15-foot VGA cable required for administration of the Vision measures.

To set up dual screen display with the external monitor as primary, do the following after the external monitor has been plugged in:

- Right click on the desktop.
- Choose Graphics options.
• Choose **Output To**.

• Hover over **Extend Desktop** and select **Monitor + Laptop** (external monitor is the primary display).

• The resolution for the monitor should be set to 1440 x 900. To set this, right click on the desktop and choose **Graphic Properties** or **Resolution**. Click the dropdown following **Resolution** to adjust it only if it is not set to 1440 x 900. You may need to repeat this process whenever the monitor is unplugged from the laptop.

• The resolution for the laptop should be set to 1366 x 768 or 1440 x 900.

Because the secondary window is implemented as a browser pop-up, you will need to **allow pop-ups** from the **Assessment Center/NIH Toolbox** web site before using the Toolbox.

During testing we recommend that automatic updates and virus scanning software be disabled, as these can disrupt the administration of the instruments.

Users should dedicate laptop(s) solely for NIH Toolbox usage. If other programs are installed on the laptop, device drivers can conflict with NIH Toolbox drivers and prevent instruments from functioning. **Laptop or Desktop Setup for NIH Toolbox Motor and Emotion Instruments:**

The Motor and Emotion instruments do not require a two-screen setup. They do, however, require a minimum resolution of 1366 x 768, Windows 7.0, and IE 8.0 to run properly.

**Mice, Keyboard, and Speakers Setup for NIH Toolbox Cognition and Sensory Instruments:**

Two mice are needed when giving Cognition or Sensory instruments: one for the examiner and one for the participant.

The keyboard is needed for the cognition processing speed and executive function instruments (Flanker, DCCS, and Pattern Comparison).
If using external speakers or headphones (recommended), plug the connector from the speakers or headphones into the computer's headphone jack.

**A note about touch-screen monitors or other input devices:** Some studies prefer to use touch-screen monitors. Touch screens that employ a mouse driver emulation can be used. Please note that response time norms for the Flanker, DCCS, and Pattern Comparison tests were collected using the keyboard arrow keys, so using a touch screen for response will invalidate the norms for those instruments. We do not provide technical support for touch screen use.

Input devices such as trackballs that use mouse drivers are also supported. Toolbox instruments cannot be used with a button box or other serial devices that are designed for use with Windows applications, as Assessment Center is a browser-based .NET application.

**USB Hub**

You will need a hub only if you are giving instruments that require additional hardware or devices, such as Words-In-Noise, Hearing Threshold, Standing Balance, and Dynamic Visual Acuity, or if your laptop does not have at least 4 USB ports.

Plug the hub into one of the laptop’s USB ports. Plug the mice used by participant and examiner, and the keyboard, into the hub’s ports. The specialized Toolbox equipment should always plug directly into one of the laptop’s USB ports.

**Bluetooth**

**Setup for the NIH Toolbox Standing Balance Test:**

The Standing Balance test uses an accelerometer to transmit sway data to the laptop using Bluetooth. The laptop must be able to receive this data using an internal Bluetooth 3.0 receiver (recommended) or an external Bluetooth receiver. The balance device comes with a power cord to recharge the internal batteries. It should be charged between examinations.

**Installing the Bluetooth Receiver:**

If the laptop does not have an internal Bluetooth 3.0 receiver, plug an external USB Bluetooth Receiver directly into one of the laptop USB ports (not the hub). You will need to install the Bluetooth receiver driver following manufacturer’s instructions.
Pairing the Bluetooth Receiver for the Standing Balance Test:

Each Bluetooth receiver is paired with an individual laptop. Keep track of which device goes with which laptop; do not switch them. If you find yourself with a balance device that is not paired with your machine you, will need to repeat the pairing process.

To pair the NIH Toolbox Standing Balance Bluetooth receiver before administering the test:

- Make sure Bluetooth is enabled: Open Control Panel and choose Devices and Printers, or choose the Bluetooth icon from the shortcut menu. If you have installed a Bluetooth receiver, you should see an icon labeled as such.
- Turn on the new balance device and click Add a device.
- Click the VA-NIH-99 icon to select the device and choose Next (each device will have a different number).
- The device will pair with the laptop and a message will ask for the pairing code. Enter default.
- The COM port assigned to the balance receiver is stored in the browser’s local storage. If you delete your browser history you may have to set this up again.

IMPORTANT! Do not turn off the Bluetooth receiver or the accelerometer while you are collecting data, as this will cause data loss and may affect the COM port.

Soundcard and Headphone setup for the NIH Toolbox Words-in-Noise and Hearing Threshold Tests:

The hearing tests require an external soundcard and headphones. Before connecting the hardware for the first time, you must install the soundcard driver from the m-audio website (www.m-audio.com). If you plug in the hardware before installing the driver, the operating system will choose a generic driver and the Toolbox instruments will not work. Take care to setup your hearing equipment properly. Failure to do so will cause the instruments not to work or the results to be invalid.
Installing the Soundcard Driver:

- Go to www.m-audio.com.
- Click Drivers/Updates (circled in red) under Quick Links.

- Select **USB Audio Series**, **Fast Track**, and **Windows 7.0** in the **Drivers and Software Search** boxes.
- Locate the **File Name** (circled in red) under **Results**. Click the link to install the driver.
- Scroll down to locate the link for the driver (circled in red).
Click **Save File** when prompted.

Open the file and follow the instructions to install the driver.

**Plugging in the Soundcard and Headphones:**

Once the sound card drivers are installed, you may plug in the soundcard and headphones and set the dials.

- Plug the mini end into the soundcard (box) and then connect the USB cable directly to a USB port on the laptop (not a port on the USB hub if one is used). If there is a USB port in the back of the laptop, this is an excellent port for the soundcard. It is important to **always** plug the headphones into the **same** USB port each time you use them. If you do not, you will lose the settings and need to reconfigure the device.

- Connect the headphones to the large stereo headphone jack on the soundcard (not the guitar jack). Make sure the connector is fully seated.

- Verify that front button and back switch are in **OFF** position.
- Set the **Mic Gain** dial to nine o'clock; set the **Guitar Gain** dial to seven o'clock; set the **Output** dial to three o'clock.

**Setup the External Sound Card:**

- Open the **Control Panel** and choose **Sound**.
- Double click on **M-Audio Fast Track**.
- On the **General** tab, enter **Headphones** for the device name.
- Select the **Levels** tab and set the sound level to **50**.
- Select the **Advanced** tab and set **Default Format** to **2 channel, 24 bit 48000Hz (Studio Quality)**.
- Click **OK** to save.
- Close the browser. If this does not work, reopen browser and try again.
Install the Java Applet for the NIH Toolbox Hearing Threshold and Words-In-Noise Tests:

The first time you launch the Hearing Threshold test you will be asked to install the Java Applet that controls the sound and logic of the test. This applet is required for the test to work. You may see a dialog box similar to the following. You should select the Allow button to install the applet. If present, you should check the box ‘Always trust content from this publisher.’

Calibrating the headphones for the NIH Toolbox Hearing Threshold Test:

Each set of headphones must be calibrated to an individual soundcard. This must be done before administering the NIH Toolbox Hearing Threshold Test and once every six months to a year thereafter. Failure to calibrate the equipment will produce invalid results.

The calibration routine is found on the NIH Toolbox website. You will need an extremely quiet room and the following equipment (shown below). It may be helpful to place the headphones and sound level meter on a pillow or piece of foam.
- Download the calibration program zip file from the NIH Toolbox website to your desktop.
- Unzip the calibration zip file to the desktop.
- Locate the run_cal.bat file, right click, and create a shortcut icon. Move the shortcut to the desktop.
- Start with the configured soundcard plugged into the laptop. If it is not plugged in and functioning, you will not be able to run the calibration program. Make sure the Direct Monitor (white) button is in the OFF position.
- Double-click the shortcut to execute the calibration program.
- Follow the instructions contained within the program until you have successfully calibrated the equipment.
- The calibration program will write values to the config.props file in the Calibration folder. You will need to copy this file to the directory C:\Program Files\NIH Toolbox Hearing Threshold\Toolbox Hearing ActiveX, which is created the first time you run the Hearing Threshold test.
- Launch the NIH Toolbox Hearing Threshold Test. You will be asked to install the required ActiveX component for the test. Allow the component to be installed.
- Copy the config.props file to the C:\Program Files\NIH Toolbox Hearing Threshold\Toolbox Hearing ActiveX directory. The existing file will be overwritten.
**Equipment Setup for the NIH Toolbox Dynamic Visual Acuity Test:**

The NIH Dynamic Visual Acuity Test uses a rate sensor attached to headgear connected to the computer with a supplied mini USB-to-USB cable. Make sure the laptop is turned on with Windows running before plugging in this equipment. If you plug this equipment in first and then turn on the laptop, you may receive a blue screen of death (BSOD).

- Plug the USB end directly into a USB port on the laptop (preferably on the right side), not a USB port on the external hub.
- Connect the DVA headgear to the other end of the cable via the supplied mini-USB plug.
- The DVA device should begin working once it is plugged in and the XR21V device driver is installed.
- If the DVA device stops working, it is often due to a disruption in the communication between the USB/COM port and the device. Reasons this may happen include allowing the PC to go into hibernate mode during the test or letting the test time out. If this happens:
  - unplug the cable, plug it back into the same USB port, and wait approximately 10 seconds for COM port to be recognized (see lower right for message).
  - If necessary, restart the test by closing out of both the browser and the DVA application. If it is still a problem, reboot the laptop.
Frequently Asked Questions (FAQs)

Please consult this list before calling Tech Support

The following steps should solve most low-level problems:

1) If external monitor displays **No Signal Detected** or nothing at all, do the following:
   - Right click on the desktop.
   - Choose **Output To**.
   - Hover over **Extend Desktop**.
   - Select **Monitor + Laptop**.
   - Ensure the laptop on which the Toolbox is given is set up with the following settings:
     - Windows 7: hibernate **OFF** if using Toolbox equipment; Windows updates **OFF** during test administration;
     - IE 9: on-click sound turned **OFF**, compatibility mode **ON**;
     - Virus scan software: automatic scans turned **OFF** so as not to disrupt the testing session.

2) If your problem is not resolved after trying the above steps, please consult the list of frequently asked questions below.

**General Hardware and Software FAQs**

Nothing is displayed on the monitor or the monitor is displaying weird colors:
- Check the VGA cable and ensure it is seated firmly into the VGA port on the left side of the laptop. Then, follow the steps immediately below to setup two screens.

You see only one screen on a two-screen instrument:
- Move the monitor to the **left side of the laptop**.
  OR, if that does not correct it:
    - Right click on the desktop.
    - Choose **Graphic Options**.
    - Choose **Output To**.
o Hover over **Extend Desktop**.
o Select **Monitor + Laptop**.

OR, if that does not correct it:

o Make sure that pop-ups are enabled for the Toolbox website: Click **Tools > Popup blocker** in IE.

OR, if that does not correct it:

o Hover over the Internet Explorer icon in the system tray at the bottom of the screen. If two windows are there, click on the window you could not see.

OR if that does not correct it:

o Click the participant screen and press **CTRL+R** to refresh.

**On the examiner (laptop) screen...**

I can’t see the Start Test button:

- Verify that your screen resolution is set to 1366 x 768 or 1440 x 900;
  OR
- Grab the title bar of the examiner screen and move it up and down a bit on the screen to see if it adjusts itself;
  OR
- Grab the lower boundary of the screen and expand the window size.

I can’t see the title bar:

This can happen if your laptop resolution is not set to 1366 x 768. You should not have to move the window, so you can simply leave it alone until you are finished testing your participant.

The examiner screen doesn’t open automatically at the beginning of a test (or during a test):

- First, hover over the **IE** icon in the system tray on the external monitor to see if two instances open. If yes, select the examiner window. It should open on the laptop and stay open. If it opens on the participant screen, click on the title bar and drag the window from the monitor screen to the laptop screen. This should correct the problem. If necessary, close the browser and then reopen it.
- When you hover over the IE icon in the system tray, if only one instance appears, click the open browser to select it and press **F5**. Select refresh on the menu bar or click **CTRL+R** to refresh the screens.
The shading on the examiner screen is uneven:
- From the Tools menu on IE, make sure Compatibility mode is selected.

When attempting to log in a participant…

I get an error saying the PIN and Password combination is wrong:
- Log in as yourself.
- Click Registration Details on the Administration tab in Assessment Center.
- Verify that the password listed is the one you believe you entered.

I get an error stating no assessment is scheduled for this participant:
- Log in as yourself.
- Click Registration Details on the Administration tab in Assessment Center.
- Select View Schedule Details.
- Verify the schedule start and end date listed includes today’s date. If not, adjust the schedule:
  - Edit the End Date for the Baseline or Retest event to a date beyond the current date.
  - Click the pencil icon to the left to save. The line turns green to indicate the testing window is now open.
  - Close the window, log out, and re-enter the participant PIN.
FAQs for Individual Instruments  
(in alphabetical order)

Emotion Domain
A participant with limited vision wants to increase the font size for survey-type instruments:

Use the **Zoom** feature of IE to make the text larger. Note that the participant will have to scroll down to see the navigation buttons.
- With the focus on the participant screen, hold down the Ctrl key and press the plus (+) key (**Ctrl+**) one or more times until you reach the desired size.
- To reduce the text size, follow the same procedure, but use the minus (-) key (**Ctrl-**).

Hearing Threshold Test (Sensory domain)

I am trying to skip HTT but it is not working:

Once the HTT is started it will take several seconds to skip it. Be patient and wait for it to work. **DO NOT** click **Skip Test** again or you may end up skipping the next test as well.

**Hearing Threshold Test buttons don’t work or no sound is heard for the instructions:**

- Verify sound card is plugged directly into the correct USB port of the laptop.
- Verify that headphones are securely connected to headphone (**not guitar**) jack of soundcard and that front button and back switch are in **OFF** position.

If that does not work, check the external soundcard settings as described in the set-up section above.

List Sorting Working Memory (Cognition domain)

Scroll bars are present on the pictures on list sorting:

From the **Menu** or **Command** bar of IE, select **Zoom** and make sure it is set to **100%**.

Pattern Comparison Processing Speed (Cognition domain)

I stopped the test before it was completed, and when I log back in it takes me to the next test:

Pattern comparison is a timed test. Once you start it, you must complete it. You cannot resume.
Picture Sequence Memory (Cognition Domain)

I can’t get past Arranging Flowers. The NEXT button is inactive.

You must follow the training sequence steps in the manual or on screen to enable the button:

- Move both pictures from the mat to the boxes.
- Move both pictures back to the mat.
- Move one or more pictures from one box to the other box.

Please refer to the Picture Sequence Memory section of the manual and follow the sequence as described.
Education and Handedness Instructions

Education Questions
Information about the participant’s educational level must appear at the beginning of every NIH Toolbox study. It is found under the Instrument tab for each domain. This information is needed for the scoring of each test as education is one of the variables considered in the fully adjusted norms.

For children under the age of 18, there is a second set of education questions that asks the adult accompanying the child about the parent’s educational level. For these younger participants, parental education is used in the norms.

In addition, a participant’s education is used to determine where to begin the presentation of items in the language tests that are Computer Adapted.

Participant education questions are listed under the instrument header as: NIH TB Education Info; and parental education questions are found under the instrument header as: NIH TB Parent Education.

Handedness Questions
A series of questions related to handedness must be included after the education instrument(s) if the study includes either the Cognition or Motor domains. This information is required because there are measures in these domains that require the participant to use his/her dominant hand and in the Motor domain, some of the scoring uses this information as well.

Handedness questions are found under the instrument header as: NIH TB Handedness Info.
Education

What is the highest grade in school (level of education) that you have completed?
Parent Education

When testing children ages 3 to 17, ask what is highest level of education the biological mother (or parent / guardian living with the child) has completed.
Determining Handedness Instructions

Materials:
Ball
Pencil/pen
Paper

The examiner should determine handedness by asking the participant or the parent/guardian the following question: Are you... or Is your child right- or left- handed?

☐ Right ☐ Left ☐ Unsure

If the participant or parent/guardian is unsure or responds that different hands are used for different activities, ask the following three questions:

1) Which hand do you (does your child) use to pick up and throw a ball? Demonstrate with a ball if necessary.
   ☐ Right ☐ Left

2) Which hand do you (does your child) use to write or draw? Demonstrate with a pencil or pen if necessary.
   ☐ Right ☐ Left

3) Which foot do you (does your child) use to kick a ball? Demonstrate with a ball if necessary.
   ☐ Right ☐ Left

When the participant is asked to use the dominant hand for a task, he or she should use the hand/foot that he/she uses for the majority of the tasks above. The examiner should record handedness on the motor data sheet and the data screens when they appear.
Picture Vocabulary Test

Materials:
Laptop computer
Monitor and speakers
Mouse

Description:
This measure of receptive vocabulary is administered in a computer-adaptive format. The participant is presented with four pictures on the computer screen and a recorded voice saying a word. The participant is instructed to click on the picture that most closely shows the meaning of the word. Because the test uses a variable-length CAT with a minimum of 20 items and a maximum of 30 items, some participants will have fewer items. The words presented will depend on the participant’s performance. The test should take a maximum of 5 minutes.

General Instructions:
1) The opening/introductory instructions are on the examiner’s screen and are read to the participants; all other instructions are pre-recorded. These instructions differ slightly for different age groups (3-7 and 8-85 in English; 3-7, 8-17, and 18-85 in Spanish).

2) Before beginning, make sure the speakers are turned on for later instructions and presentation of the words.

3) If the participant says he/she does not understand the word after several repetitions, the examiner may say the word one more time.

If a participant has difficulty using the mouse, he/she may point and the examiner should operate the mouse. In this case, the examiner should say something like the following to the participant: You can point to your choice and then I will use the mouse to click on it for you in English; or Señala la imagen que quieres elegir y yo haré clic en ella con el ratón (Ages 3-17) and Señale la imagen que quiera elegir y yo haré clic en ella con el ratón (Ages 18-85) in Spanish.
Picture Vocabulary Instructions

The task is introduced with the following: the examiner should say:

Let’s look at some pictures. You’ll hear a word and see four pictures on the screen. Click on the picture that means the same as the word that was said. Some words will be easy and some will be harder. If you are not sure of an answer, just make your best guess. If you need to hear a word again, click on the button that has a picture of an EAR, also called the PLAY AGAIN button. After you click on a picture, you will hear a new word and see more pictures.

If you are not sure of an answer, just make your best guess. If you make a mistake and want to change your last answer, click on the HAND, also called the GO BACK button. The pictures you just saw will reappear and you will hear the word again. Click on your choice, and then more words and pictures will appear. Tell me when you are ready to start. Click NEXT when the child is ready.

Practice item 1:
The computer says: Let’s try one for practice: Banana. Click on the picture of Banana.

If correct, the computer says: That’s right! The computer will automatically go to the next practice item.

If incorrect, the Banana picture will light up and the computer will say: This is a banana. Let’s try again.

The examiner should allow the child up to three chances to answer this practice item correctly. After three unsuccessful attempts by the child, the examiner should click on the picture of the banana on the child’s screen and say: This is a banana. The computer will automatically go to the next practice item.

Practice item 2:
The computer says: Let’s try another word: Spoon. Click on the picture of Spoon.

If correct, the computer says: That’s right!

If incorrect, the Spoon picture will light up and the computer will say: This is a spoon. Let’s try again.

The examiner should allow the child up to three chances to correctly answer this practice item. After three unsuccessful attempts by the child, the examiner should click on the picture of the spoon and say: This is a spoon.
Before continuing, the examiner should review the task with the child, saying:

*Remember, you will hear a voice say a word and then you will see four pictures. One of the pictures will show what the word means. Click on that picture and you will hear a new word and see four more pictures. Again, click on the picture that shows what the word means. If you don’t know, make your best guess. Any questions? The examiner should answer the questions.*

Test items:

The examiner says: *Now, let’s try some more. When you are ready, click the button with the HAND to continue.*

*Warning: The hand itself is not live; the child must click on the area around the word. The examiner may help if needed.*

A recording will introduce each word with the instructions: *Click on the picture of…. The items will continue in this format until the test is completed.*

*Remember: If a child has difficulty using the mouse, he/she may point and the examiner can operate the mouse. If the child says that he/she does not understand the word after several repetitions, the examiner may say the word one more time.*
Picture Vocabulary Instructions

The task is introduced with the following; the examiner should say:

You are going to be asked the meaning of some words. For each item, you will hear a word and see four pictures on the screen. Click on the picture that you think best matches the meaning of the word that was said. If you are not sure, make your best guess. If you need to hear the word again, click on the button that has a picture of an EAR, also called the PLAY AGAIN button. After you make your choice and click on a picture, the computer will automatically go to the next word and pictures. You will keep hearing words and clicking on pictures until you are done.

If you want to change your choice, click on the button with the HAND that says GO BACK and change your choice. Each time you make a choice, the computer automatically gives you a new word and a new set of pictures.

Remember, if you are not sure of an answer, make your best guess. Tell me when you are ready to start.

Once the participant is ready, the examiner can click NEXT.

Practice item 1:
The computer says: Let’s try one for practice: Banana. Click on the picture of Banana.

If correct, the computer says: That’s right! The computer will automatically go to the next practice item.

If incorrect, the Banana picture lights up and the computer says: This is a banana. Let’s try again.

The examiner should allow the participant up to three chances to correctly answer this practice item. After three unsuccessful attempts by the participant, the examiner should click on the picture of the banana and say: This is a banana. The computer will automatically go to the next practice item.

Practice item 2:
The computer says: Let’s try another word: Spoon. Click on the picture of Spoon.

If correct, the computer says: That’s right!

If incorrect, the Spoon picture lights up and the computer says: This is a spoon. Let’s try again. The examiner should allow the participant up to three chances to correctly answer this practice item. After three unsuccessful attempts by the participant, the examiner should click on the picture of the spoon and say: This is a spoon.
Before continuing, the examiner should review the task with the participant, saying:

Remember, you will hear a word and then you will see four pictures. One of the pictures will show what the word means. Click on that picture; then you will hear another word and see four more pictures. Again, click on the picture that shows what the word means. If you don't know an answer, make your best guess. Any questions? The examiner should answer the questions.

Test items:
The examiner says: Now, we're going to do some more. Some of the words will be easier and some will be more difficult. Just try your best on each question. When you're ready, click the NEXT button to start.

Words and sets of pictures will be presented until the test is completed. Each time, the recording will say: [Word]. If necessary, prompt the participants that they will hear only the word presented each time, without an introductory phrase such as click on the....

Remember: If a participant has difficulty using the mouse, he/she may point and the examiner can operate the mouse. If the participant says that he/she does not understand the word after several repetitions, the examiner may say the word one more time.
Flanker Inhibitory Control & Attention

Materials:
Laptop
Monitor
Keyboard

Description:
The Flanker task is a measure of inhibitory control and attention. The Flanker requires the participant to focus on a particular stimulus while inhibiting attention to the stimuli flanking it. In this version, younger participants see a fish flanked by two other fish on either side.

On congruent trials, all the fish are pointing in the same direction. On incongruent trials, the flanking fish are pointing in the opposite direction of the central fish. Congruent and incongruent trials are mixed. The word middle appears on the screen; for younger participants (ages 3-11), a prerecorded voice says "MIDDLE" to remind participants where to focus.

Older participants (8-85 years) are presented with arrows instead of fish. All participants are instructed to use their index/pointer finger to choose one of two buttons on the screen that corresponds to the direction in which the MIDDLE fish or arrow is pointing.

All the instructions are on the screen. The examiner reads them to and/or with the participant and points out the relevant aspects of the stimuli on the screen.

For all participants, four practice trials are given. If the participant responds incorrectly, the computer voice prompts him/her to choose the correct button. If the participant does not respond after five seconds, prompt him/her to do so by saying, “Choose one of the buttons” in English or “Elige uno de los botones” (ages 3-17 years) or “Elija uno de los botones” (ages 18-85 years) in Spanish.

The participant must get at least three out of four practice trials correct to advance to the test trials. If a participant gets fewer than three out of four practice trials correct, he/she will complete up to two more sets of four practice trials. If, on the last set, he/she gets fewer than three of the four trials correct, the task will automatically terminate (i.e., will advance to the final screen).

One block of 20 test trials is used for all participants. If a participant age 3-7 achieves 90 percent correct on the fish trials, he/she will also receive a set of 20 arrow trials.
## Flanker Instructions

The table below outlines the item content and the actions for the examiner.

<table>
<thead>
<tr>
<th>Child (C) screen written content</th>
<th>Examiner (E) Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRACTICE Introduction</strong></td>
<td>Points to C’s screen, then clicks NEXT on E’s screen.</td>
</tr>
<tr>
<td>Here is a Fish!</td>
<td>Points to C’s screen, then clicks NEXT on E’s screen.</td>
</tr>
<tr>
<td>This is the TAIL -&gt; [fish] &lt;- This is the MOUTH.</td>
<td>Points to C’s screen, then clicks NEXT on E’s screen.</td>
</tr>
<tr>
<td>The fish is pointing this way, the same way the fish is swimming.</td>
<td>Points to C’s screen, then clicks NEXT on E’s screen.</td>
</tr>
<tr>
<td>Here the MIDDLE fish is circled. Can you point to the MIDDLE fish?</td>
<td>Child points; E clicks NEXT on E's screen.</td>
</tr>
<tr>
<td>Where is the MIDDLE fish here?</td>
<td>Child points; E clicks NEXT on E's screen.</td>
</tr>
<tr>
<td>Look at all the fish!!! The fish in the MIDDLE is hungry.</td>
<td>Clicks NEXT.</td>
</tr>
<tr>
<td>To feed the MIDDLE fish, choose the button that matches the way the MIDDLE fish is pointing.</td>
<td>Demonstrates using index finger with keyboard.</td>
</tr>
<tr>
<td>If the MIDDLE fish is pointing this way, choose this button.</td>
<td>Demonstrates use of keyboard.</td>
</tr>
<tr>
<td>If the MIDDLE fish is pointing this way, choose that button.</td>
<td>Demonstrates use of keyboard.</td>
</tr>
<tr>
<td>Sometimes all the fish face the same way. Sometimes the MIDDLE fish faces a different way from his friends, like this: [incongruent fish]. You should always choose the button that matches the way the MIDDLE fish is pointing. You will hear and see the word MIDDLE to remind you.</td>
<td>Points, then chooses button.</td>
</tr>
<tr>
<td>Here, the MIDDLE fish is pointing this way, so I’ll choose this button.</td>
<td>Points, then chooses button.</td>
</tr>
<tr>
<td>Here, the MIDDLE fish is pointing this way, so I’ll choose this button.</td>
<td>Points, then chooses button.</td>
</tr>
<tr>
<td><strong>Transition to practice items</strong></td>
<td>Clicks NEXT on E’s screen.</td>
</tr>
<tr>
<td>Now you try. Keep your eyes on the star. Answer as fast as you can without making mistakes. If you make a mistake, just keep going.</td>
<td>Clicks NEXT on E’s screen.</td>
</tr>
<tr>
<td><strong>More practice, if needed</strong></td>
<td>Points, then chooses button.</td>
</tr>
<tr>
<td>Let’s practice some more. If the MIDDLE fish is pointing this way, choose this button.</td>
<td>Points, then chooses button.</td>
</tr>
<tr>
<td>If the MIDDLE fish is pointing this way, choose that button.</td>
<td>Points, then chooses button.</td>
</tr>
<tr>
<td><strong>Transition to more practice items</strong></td>
<td>Clicks NEXT on E’s screen.</td>
</tr>
<tr>
<td>Now you try. Keep your eyes on the star. Answer as fast as you can without making mistakes. If you make a mistake, just keep going.</td>
<td>Clicks NEXT on E’s screen.</td>
</tr>
<tr>
<td><strong>4 practice items</strong></td>
<td></td>
</tr>
<tr>
<td><strong>4 practice items</strong></td>
<td></td>
</tr>
<tr>
<td>Child (C) screen written content</td>
<td>Examiner (E) Action</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>More practice, if needed</td>
<td>Points, then chooses button.</td>
</tr>
<tr>
<td>Let’s practice some more. If the MIDDLE fish is pointing this way, choose this button.</td>
<td></td>
</tr>
<tr>
<td>If the MIDDLE fish is pointing this way, choose that button.</td>
<td></td>
</tr>
<tr>
<td>Transition to more practice items</td>
<td></td>
</tr>
<tr>
<td>Now you try.</td>
<td>Clicks NEXT on E’s screen.</td>
</tr>
<tr>
<td>Keep your eyes on the star.</td>
<td></td>
</tr>
<tr>
<td>Answer as fast as you can without making mistakes.</td>
<td></td>
</tr>
<tr>
<td>If you make a mistake, just keep going.</td>
<td></td>
</tr>
<tr>
<td>4 practice items</td>
<td></td>
</tr>
<tr>
<td>Test items transition</td>
<td></td>
</tr>
<tr>
<td>Now you’re ready to do this without me.</td>
<td></td>
</tr>
<tr>
<td>Keep your eyes on the star.</td>
<td></td>
</tr>
<tr>
<td>Answer as fast as you can without making mistakes.</td>
<td></td>
</tr>
<tr>
<td>If you make a mistake, just keep going.</td>
<td></td>
</tr>
<tr>
<td>Clicks NEXT on E’s screen.</td>
<td></td>
</tr>
<tr>
<td>Test items</td>
<td></td>
</tr>
<tr>
<td>20 test items (fish)</td>
<td></td>
</tr>
<tr>
<td>More test items if 90% success on fish</td>
<td></td>
</tr>
<tr>
<td>Now you will do the same thing, but you will see arrows instead of fish.</td>
<td></td>
</tr>
<tr>
<td>Keep your eyes on the star.</td>
<td></td>
</tr>
<tr>
<td>Answer as fast as you can without making mistakes.</td>
<td></td>
</tr>
<tr>
<td>If you make a mistake, just keep going.</td>
<td></td>
</tr>
<tr>
<td>Clicks NEXT on E’s screen.</td>
<td></td>
</tr>
<tr>
<td>20 test items (arrows)</td>
<td></td>
</tr>
</tbody>
</table>
**Flanker Instructions**

The table below outlines the item content and the actions for the examiner.

<table>
<thead>
<tr>
<th>Participant (P) screen written content</th>
<th>Examiner (E) Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRACTICE</strong></td>
<td></td>
</tr>
<tr>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>In this task, you will see a row of arrows. You should choose the button that matches the way the MIDDLE arrow is pointing.</td>
<td>E points to left arrow on the P’s screen and demonstrates use of index finger to choose the correct arrow.</td>
</tr>
<tr>
<td>If the MIDDLE arrow is pointing this way, choose this button.</td>
<td>Demonstrates use of keyboard.</td>
</tr>
<tr>
<td>If the MIDDLE arrow is pointing that way, choose that button.</td>
<td>Demonstrates use of keyboard.</td>
</tr>
<tr>
<td>Sometimes all the arrows point the same way. Sometimes the middle arrow faces or points a different way, like this [picture of incongruent arrows]. You should always choose the button that matches the way the MIDDLE arrow is pointing. You will see the word MIDDLE to remind you.</td>
<td>Demonstrates use of keyboard.</td>
</tr>
<tr>
<td><strong>Transition to practice items</strong></td>
<td></td>
</tr>
<tr>
<td>Now you try.</td>
<td></td>
</tr>
<tr>
<td>Keep your eyes on the star.</td>
<td></td>
</tr>
<tr>
<td>Answer as fast as you can without making mistakes.</td>
<td></td>
</tr>
<tr>
<td>If you make a mistake, just keep going.</td>
<td></td>
</tr>
<tr>
<td>4 practice items</td>
<td></td>
</tr>
<tr>
<td><strong>More practice, if needed</strong></td>
<td></td>
</tr>
<tr>
<td>Let’s practice some more. If the MIDDLE arrow is pointing this way, choose this button.</td>
<td>Demonstrates use of keyboard.</td>
</tr>
<tr>
<td>If the MIDDLE arrow is pointing this way, choose that button.</td>
<td>Demonstrates use of keyboard.</td>
</tr>
<tr>
<td>Transition to more practice items</td>
<td></td>
</tr>
<tr>
<td>Now you try.</td>
<td></td>
</tr>
<tr>
<td>Keep your eyes on the star.</td>
<td></td>
</tr>
<tr>
<td>Answer as fast as you can without making mistakes.</td>
<td></td>
</tr>
<tr>
<td>If you make a mistake, just keep going.</td>
<td></td>
</tr>
<tr>
<td>4 practice items</td>
<td></td>
</tr>
<tr>
<td>More practice, if needed</td>
<td></td>
</tr>
<tr>
<td>Let’s practice some more. If the MIDDLE arrow is pointing this way, choose this button.</td>
<td>Demonstrates use of keyboard.</td>
</tr>
<tr>
<td>If the MIDDLE arrow is pointing this way, choose that button.</td>
<td>Demonstrates use of keyboard.</td>
</tr>
<tr>
<td>Transition to more practice items</td>
<td></td>
</tr>
<tr>
<td>Now you try.</td>
<td></td>
</tr>
<tr>
<td>Keep your eyes on the star.</td>
<td></td>
</tr>
<tr>
<td>Answer as fast as you can without making mistakes.</td>
<td></td>
</tr>
<tr>
<td>If you make a mistake, just keep going.</td>
<td></td>
</tr>
<tr>
<td>4 practice items</td>
<td></td>
</tr>
</tbody>
</table>
### Participant (P) screen written content

<table>
<thead>
<tr>
<th>Test Items Introduction</th>
<th>Examiner (E) Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Now you’re ready to do this without me. Keep your eyes on the star. Answer as fast as you can without making mistakes. If you make a mistake, just keep going.</td>
<td>Clicks NEXT on E’s screen.</td>
</tr>
</tbody>
</table>

| Test Items | 20 items (arrows) |
List Sorting Working Memory

Materials:
Laptop & mouse
Monitor with speakers

Description:
This task assesses working memory and requires the participant to sequence different visually- and orally-presented stimuli. Pictures of different foods and animals are displayed with both a sound clip and written text that name the item. The task has two different conditions: 1-List and 2-List. In the 1-List condition, participants are required to order a series of objects (either food or animals) in size order from smallest to largest. In the 2-List condition, participants are presented both food and animals and are asked to report the food in size order, followed by the animals in size order.

Children ages 3-6 have four practice items in each condition: two practice items in which the images appear simultaneously on the screen and two practice items in which the images briefly “flash” sequentially on the screen. Participants ages 7-85 have two practice items, both “flashing” in each condition. Different instructions are provided for 3-6 and 7-85 year olds in English and for 3-6, 7-17 and 18-85 year olds in Spanish.

All actual test items are presented in a “flashing” manner.

Introduction:
For an item to be marked correct, the participant must name all the stimuli in the correct order without any intrusions. A participant may change his/her response. It is also acceptable for a participant to give a synonym for either a food item or an animal. For example, in English, responses such as these should be marked as correct: puppy for dog, bunny for rabbit, and lamb for sheep. In Spanish, the following synonyms are considered acceptable:

<table>
<thead>
<tr>
<th>English</th>
<th>Spanish</th>
<th>Synonym(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blueberry</td>
<td>Arándano azul</td>
<td>Arándano/mora azul</td>
</tr>
<tr>
<td>Banana</td>
<td>Banana</td>
<td>Plátano/guineo</td>
</tr>
<tr>
<td>Strawberry</td>
<td>Fresa</td>
<td>Frutilla</td>
</tr>
<tr>
<td>Pineapple</td>
<td>Piña</td>
<td>Anana</td>
</tr>
<tr>
<td>Peach</td>
<td>Durazno</td>
<td>Melocotón</td>
</tr>
<tr>
<td>Pig</td>
<td>Cerdo</td>
<td>Puerco</td>
</tr>
</tbody>
</table>
NOTE: Throughout the test, the examiner may need to remind the participant:

In English: It is important to pay attention to the size of the object on the screen (not what they have experienced) when putting things in size order from smallest to biggest.

In Spanish: Es importante que te fijes en el tamaño de los objetos que aparecen en la pantalla para ordenarlos por tamaño, del más pequeño al más grande. (Ages 3-17) Es importante que se fije en el tamaño de los objetos que aparecen en la pantalla para ordenarlos por tamaño, del más pequeño al más grande. (Ages 18-85)

Several discontinue rules are embedded in the software:

- If a participant does not complete a practice item correctly, the test itself is not administered.
- If a participant has incorrect responses on both parts of a test item, the test is discontinued.
- If the participant has a score of 1 point as the sum of the two sets of 2-stimulus items (pig-mouse and bird-cow; banana-watermelon and apple-blueberry) and a score of 0 points on the set of 3-stimulus items (pumpkin-strawberry-banana and dog-horse-rabbit) in the 1-list condition, the test is discontinued and the 2-list condition is not administered.

As participants answer verbally, the examiner records their responses on the computer. The examiner marks the item correct if the participant responds with all the items in the exact order, without any intrusions, by clicking the Yes button. If the participant’s response is incorrect, the examiner will select the No button.

If necessary, examiners can provide short breaks between items.

It is also acceptable during the 2-List condition to remind participants of the rules (e.g., tell me the foods first, then the animals).

REMINDER: When using external speakers, the sound must be turned on before starting test.
Table 1: 1-List items

<table>
<thead>
<tr>
<th>Item A</th>
<th>Item B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana Watermelon</td>
<td>Apple Blueberry</td>
</tr>
<tr>
<td>Pig Mouse**</td>
<td>Bird Cow</td>
</tr>
<tr>
<td>Pumpkin Strawberry Banana</td>
<td>Dog Horse Rabbit</td>
</tr>
<tr>
<td>Elephant Butterfly Pig Rabbit</td>
<td>Pineapple Strawberry Pear Blueberry</td>
</tr>
<tr>
<td>Bird Bear Elephant Dog Duck</td>
<td>Sheep Bee Horse Cat Mouse</td>
</tr>
<tr>
<td>Blueberry Strawberry Lemon Pineapple Cherry Pumpkin</td>
<td>Horse Cat Turtle Bee Frog Dog</td>
</tr>
<tr>
<td>Dog Frog Elephant Butterfly Rabbit Tiger Camel</td>
<td>Hamburger Popcorn Peach Pumpkin Corn Strawberry Lemon</td>
</tr>
</tbody>
</table>

**test begins here**

Table 2: 2-List items

<table>
<thead>
<tr>
<th>Item A</th>
<th>Item B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cow Popcorn**</td>
<td>Rabbit Corn</td>
</tr>
<tr>
<td>Elephant Pumpkin Duck</td>
<td>Apple Cat Watermelon</td>
</tr>
<tr>
<td>Strawberry Dog Corn Turtle</td>
<td>Hamburger Pig Orange Lion</td>
</tr>
<tr>
<td>Peach Elephant Blueberry Tiger Rabbit</td>
<td>Cherry Duck Egg Bird Apple</td>
</tr>
<tr>
<td>Pineapple Monkey Cherry Bear Banana Turtle</td>
<td>Pineapple Pig Peach Mouse Blueberry Horse</td>
</tr>
<tr>
<td>Orange Butterfly Egg Cow Blueberry Duck Pineapple</td>
<td>Rabbit Pear Bird Watermelon Sheep Cherry Tiger</td>
</tr>
</tbody>
</table>

**test begins here**
List Sort Instructions

For this age group, each practice item has multiple questions. Letters designate the question (e.g., A, B). Children have two opportunities to answer each question correctly, and the examiner clicks the first (#1) or second (#2) choices on the examiner screen based on which of those trials the child answered correctly. The final choice on the examiner screen is #3, which indicates the test will be discontinued.

1-List Condition

Introduction

Say: Now, we’re going to look at things that are different sizes. Some of the things are small and some things are big (use hand gestures). Your job is to tell me what is smallest and what is biggest. Let’s start by looking at some pictures of animals together. Click START TEST.

1-List Practice Item 1:

Continue: Click PLAY; say: This is a dog (point to dog on screen) and this is a horse (point to horse).

Question A: Say: Tell me which animal is the smaller animal. If child does not respond, say: Which is smaller, the DOG or the HORSE?

Correct Response:

If child says DOG, say: Good job. Click #1 on examiner’s screen; then click NEXT. Computer automatically goes to next question.

Incorrect Response:

If child does not say DOG, say: Let’s try that again. See, the DOG is smaller than the HORSE (point out relative sizes using gestures). Now, tell me the smaller animal. If child says DOG, say: Good job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know smaller animal after two trials, click #3; then click NEXT. Test will be discontinued.

Question B: Click PLAY; say: Now, tell me the bigger animal.

Correct Response:

If child says HORSE, say: Good job. Click #1; then click NEXT. Computer automatically goes to next question.
Incorrect Response:
If child does not say HORSE, say: Let’s try that again. See, the HORSE is bigger than the DOG (point out relative sizes). Now, tell me the bigger animal. If child says HORSE, say: Good job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know bigger animal after two trials, click #3; then click NEXT. Test will be discontinued.

1-List Practice Item 2:
Say: Now we are going to do some more. Click PLAY; say: This is a RABBIT (point to RABBIT); this is a SHEEP (point); and this is an ELEPHANT (point).

Question A: Say: Tell me the smallest animal.

Correct Response:
If child says RABBIT, say: Good job. Click #1; then click NEXT. Computer automatically goes to next question.

Incorrect Response:
If child does not say RABBIT, say: Let’s try that again. See, the RABBIT is smaller than the SHEEP (point), and the RABBIT is smaller than the ELEPHANT (point). The RABBIT is the smallest animal. OK, now you tell me the smallest animal. If child says RABBIT, say: Good job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know smallest animal after two trials, click #3; then click NEXT. Test will be discontinued.

Question B: Click PLAY; say: Now tell me the NEXT biggest animal.

Correct Response:
If child says SHEEP, say: Good job. Click #1; then click NEXT. Computer automatically goes to next question.

Incorrect Response:
If child does not say SHEEP, say: Let’s try that again. See, the SHEEP is bigger than the RABBIT (point) and the SHEEP is smaller than the ELEPHANT (point). We know that the RABBIT is the smallest animal; tell me the next biggest animal. If child says SHEEP, say: Good job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know next biggest animal after two trials, click #3; then click NEXT. Test will be discontinued.
Question C: Click **PLAY**; say: **Now tell me the biggest animal.**

**Correct Response:**

If child says ELEPHANT, say: **Good job.** Click #1; then click **NEXT.** Computer automatically goes to next question.

**Incorrect Response:**

If child does not say ELEPHANT, say: **Let’s try that again. See, the ELEPHANT is bigger than the RABBIT** (point), **and the ELEPHANT is bigger than the SHEEP** (point). **We know that the RABBIT is the smallest animal, and the SHEEP is the next biggest animal; tell me the biggest animal.** If child says ELEPHANT, say: **Good Job.** Click #2; then click **NEXT.** Computer automatically goes to next question.

If child does not know biggest animal after two trials, click #3; then click **NEXT.** Test will be discontinued.

1-List Practice Item 3:

Say: **Now we are going to do some more. This time, you’re only going to see one picture at a time. You have to remember what you see and tell me the smaller and then the bigger animal. Let’s start by looking together.** Click **PLAY.**

**Question A:** When screen is blank, say: **Now, tell me the smaller animal.**

**Correct Response:**

If child says DOG, say: **Good job.** Click #1 on examiner’s screen; then click **NEXT.** Computer automatically goes to next question.

**Incorrect Response:**

If child does not say DOG, say: **Let’s try that again. Click **PLAY** again; when screen is blank, say: **See, the DOG is smaller than the HORSE. Now, tell me the smaller animal.** If child says DOG, say: **Good job.** Click #2; then click **NEXT.** Computer automatically goes to next question.

If child does not know smaller animal after two trials, click #3; then click **NEXT.** Test will be discontinued.

**Question B:** Click **PLAY;** when screen is blank, say: **Now, tell me the bigger animal.**

**Correct Response:**

If child says HORSE, say: **Good job.** Click #1; then click **NEXT.** Computer automatically goes to next question.
Incorrect Response:
If child does not say HORSE, say: Let’s try that again. Click PLAY again; when screen is blank, say: See, the HORSE is bigger than the DOG. Now, tell me the bigger animal. If child says HORSE, say: Good Job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know bigger animal after two trials, click #3; then click NEXT. Test will be discontinued.

1-List Practice Item 4:
Say: Now we are going to do some more. Are you ready? Click PLAY.

Question A: When the screen is blank, say: Tell me the smallest animal.

Correct Response:
If child says RABBIT, say: Good job. Click #1; then click NEXT. Computer automatically goes to next question.

Incorrect Response:
If child does not say RABBIT, say: Let’s try that again. Click PLAY again; when screen is blank, say: See, the RABBIT is smaller than the SHEEP, and the RABBIT is smaller than the ELEPHANT. The RABBIT is the smallest animal. OK, now you tell me the smallest animal. If child says RABBIT, say: Good job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know smallest animal after two trials, click #3; then click NEXT. Test will be discontinued.

Question B: Click PLAY. When screen is blank, say: Now tell me the next biggest animal.

Correct Response:
If child says SHEEP, say: Good job. Click #1; then click NEXT. Computer automatically goes to next question.

Incorrect Response:
If child does not say SHEEP, say: Let’s try that again. Click PLAY again; when screen is blank, say: See, the SHEEP is bigger than the RABBIT, and the SHEEP is smaller than the ELEPHANT. We know that the RABBIT is the smallest animal; tell me the next biggest animal. If child says SHEEP, say: Good job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know next biggest animal after two trials, click #3; then click NEXT. Test will be discontinued.
Question C: Click PLAY. When screen is blank, say: Now tell me the biggest animal.

Correct Response:
If child says ELEPHANT, say: Good job. Click #1; then click NEXT. Computer automatically goes to next question.

Incorrect Response:
If child does not say ELEPHANT, say: Let's try that again. Click PLAY again; when screen is blank, say: See, the ELEPHANT is bigger than the RABBIT, and the ELEPHANT is bigger than the SHEEP. We know that the RABBIT is the smallest animal, and the SHEEP is the next biggest animal; tell me the biggest animal. If child says ELEPHANT, say: Good Job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know biggest animal after two trials, click #3; then click NEXT. Test will be discontinued.

1-List Test Items:
Say: Let’s look at some more pictures. Remember, after you see the pictures you will see a blank screen. Once you see this blank screen, I want you to tell me what you just saw in size order from smallest to biggest.

Continue: It is important to pay attention to the size of the object on the screen when putting things in size order from smallest to biggest. Click NEXT.

Click PLAY; say (for the first item and then only as necessary): Once you see the blank screen, tell me what you just saw in size order from smallest to largest. Mark the item CORRECT (Yes) or INCORRECT (No) based on the child’s response.

If the child makes a CORRECT response, the computer will bring up the Pumpkin, Strawberry, Banana series and continue until the child completes all the items or until a discontinue criterion is met. If the child makes an INCORRECT response, the computer will bring up another 2-stimulus series: Bird, Cow. If a child does not succeed with the first item of a set, the second item will be presented (see tables at the end of the introduction for a list of 1-List and 2-List test items).
2-List Condition

Introduction

Say: We’re going to look at more pictures. This time, you will see both food and animals in a set of pictures. I’d like you to tell me the food first, and then the animals, in size order from smallest to biggest. It is important to pay attention to the size of the object on the screen when putting things in size order from smallest to biggest. Let’s start by looking at some more pictures together. Click NEXT.

2-List Practice Item 1:
Click PLAY; say: This is a BEAR (point) and this is a BANANA (point).

Question A: Say: Tell me which one is a food.

Correct Response:
If child says BANANA, say: Good job. Click #1; then click NEXT. Computer automatically goes to next question.

Incorrect Response:
If child does not say BANANA, say: Let’s try that again. The BEAR is an animal; the BANANA is a food. OK, now you tell me the food. If child answers BANANA, say: Good job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know food after two trials, click #3; then click NEXT. Test will be discontinued.

Question B: Click PLAY; say: Now tell me the animal.

Correct Response:
If child says BEAR, say: Good job. Click #1; then click NEXT. Computer automatically goes to next question.

Incorrect Response:
If child does not say BEAR, say: Let’s try that again. The BANANA is a food; the BEAR is an animal. OK, tell me the animal. If child answers BEAR, say: Good job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know animal after two trials, click #3; then click NEXT. Test will be discontinued.
2-List Practice Item 2:
Say: Now we are going to do some more. Click PLAY; say: This is a PINEAPPLE (point); this is a FROG (point); and this is a TIGER (point).

**Question A:** Say: Tell me the food.

**Correct Response:**
If child says PINEAPPLE, say: Good job. Click #1; then click NEXT. Computer automatically goes to next question.

**Incorrect Response:**
If child does not say PINEAPPLE, say: Let’s try that again. The FROG and TIGER are animals and the PINEAPPLE is a food (point). Now, tell me the food. If child says PINEAPPLE, say: Good job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know the food after two trials, click #3; then click NEXT. Test will be discontinued.

**Question B:** Click PLAY; say: Tell me the smaller animal.

**Correct Response:**
If child says FROG, say: Good job. Click #1; then click NEXT. Computer automatically goes to next question.

**Incorrect Response:**
If child does not say FROG, say: Let’s try that again. The FROG and TIGER are animals, and the FROG is smaller than the TIGER (point). The FROG is the smaller animal. OK, now you tell me the smaller animal. If child says FROG, say: Good job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know smaller animal after two trials, click #3; then click NEXT. Test will be discontinued.

**Question C:** Click PLAY; say: Tell me the bigger animal.

**Correct Response:**
If child says TIGER, say: Good job. Click #1; then click NEXT. Computer automatically goes to next question.
Incorrect Response:
If child does not say TIGER, say: Let's try that again. The FROG and TIGER are animals, and the TIGER is bigger than the FROG (point). The FROG is the smaller animal, and the TIGER is the bigger animal. OK, now you tell me the bigger animal. If child says TIGER, say: Good job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know bigger animal after two trials, click #3; then click NEXT. Test will be discontinued.

2-List Practice Item 3:
Say: Now we are going to do some more. This time, we're only going to see one picture at a time. You are going to have to remember what you saw AND tell me the food first, then the animal. Let's start by looking together. Click PLAY.

Question A: When screen is blank, say: Tell me the food.
Correct Response:
If child says BANANA, say: Good job. Click #1; then click NEXT. Computer automatically goes to next question.
Incorrect Response:
If child does not say BANANA, say: Let's try that again. Click PLAY again; when screen goes blank, say: You saw a BANANA and a BEAR; the BANANA is a food and the BEAR is an animal. Now you tell me the food. If child says BANANA, say: Good job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know food after two trials, click #3; then click NEXT. Test will be discontinued.

Question B: Click PLAY. When screen goes blank, say: Now tell me the animal.
Correct Response:
If child says BEAR, say: Good job. Click #1; then click NEXT. Computer automatically goes to next question.
Incorrect Response:
If child does not say BEAR, say: Let's try that again. Click PLAY again; when the screen goes blank, say: The BANANA is a food; the BEAR is an animal. OK, tell me the animal. If child answers BEAR, say: Good job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know animal after two trials, click #3; then click NEXT. Test will be discontinued.
Question C: After the child correctly identifies the food and the animal separately, click PLAY again; when the screen goes blank, say: Now, tell me the food, then the animal.

Correct Response:
If child says BANANA, BEAR, say: Good job. Click #1; then click NEXT. Computer automatically goes to next question.

Incorrect Response:
If child says BEAR, BANANA or some other incorrect pair of words, say: Let’s try that again. Click PLAY again; when the screen goes blank, say: The BEAR is an animal; the BANANA is a food. Now, tell me the food, then the animal. If child says BANANA, BEAR, say: Good job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know the food, then the animal after two trials, click #3; then click NEXT. Test will be discontinued.

2-List Practice Item 4:
Say: Now we are going to do some more. Are you ready? Click PLAY.

Question A: When the screen is blank, say: Tell me the food.

Correct Response:
If child says PINEAPPLE, say: Good job. Click #1; then click NEXT. Computer automatically goes to next question.

Incorrect Response:
If child does not say PINEAPPLE, say: Let’s try that again. Click PLAY again; when the screen goes blank, say: You saw a PINEAPPLE, a FROG and a TIGER. The PINEAPPLE is a food and the FROG and TIGER are animals. Tell me the food. If child says PINEAPPLE, say: Good job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know the food after two trials, click #3; then click NEXT. Test will be discontinued.

Question B: Click PLAY. When the screen is blank, say: Now tell me the smaller animal.

Correct Response:
If child says FROG, say: Good job. Click #1; then click NEXT. Computer automatically goes to next question.
Incorrect Response:

If child does not say FROG, say: Let’s try that again. Click PLAY again; when the screen goes blank, say: You saw a PINEAPPLE, a FROG and a TIGER; the FROG and TIGER are animals and the FROG is smaller than the TIGER. The FROG is the smaller animal. Now you tell me the smaller animal. If child says FROG, say: Good job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know the smaller animal after two trials, click #3; then click NEXT. Test will be discontinued.

Question C: Click PLAY. When the screen is blank, say: Now tell me the bigger animal.

Correct Response:

If child says TIGER, say: Good job. Click #1; then click NEXT. Computer automatically goes to next question.

Incorrect Response:

If child does not say TIGER, say: Let’s try that again. Click PLAY again; when the screen goes blank, say: You saw a PINEAPPLE, a FROG and a TIGER; the FROG and TIGER are animals and the TIGER is bigger than the FROG. The TIGER is the bigger animal. Now you tell me the bigger animal. If child says TIGER, say: Good job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know the bigger animal after two trials, click #3; then click NEXT. Test will be discontinued.

Question D: Click PLAY. When the screen is blank, say: Now tell me the food first and then the animals in size order.

Correct Response:

If child says PINEAPPLE, FROG, TIGER, say: Good job. Click #1; then click NEXT. Computer automatically goes to next question.

Incorrect Response:

If child gives the wrong order, say: Let’s try that again. Click PLAY again; when the screen goes blank, say: You saw a PINEAPPLE, a FROG and a TIGER; the FROG and TIGER are animals and the TIGER is bigger than the FROG. Now, tell me the food in size order starting with the smallest food, and then the animals in size order, from smallest to biggest. If child says PINEAPPLE, FROG, TIGER, say: Good Job. Click #2; then click NEXT. Computer automatically goes to next question.

If child does not know the food first, then the animals in size order after two trials, click #3; then click NEXT. Test will be discontinued.
2-List Test Items

Say (for the first item and then only as necessary): Let’s look at some more pictures. Remember, after you see the pictures, you will see a blank screen. Once you see this blank screen, tell me the foods first in size order from smallest to biggest, then the animals, in size order from smallest to biggest. Click PLAY; mark the item CORRECT (Yes) or INCORRECT (No) based on the child’s response.

If the child gives a CORRECT response to Cow, Popcorn, the computer will bring up the 3-stimulus item: Elephant, Pumpkin, Duck, and continue until the child completes all the items or until a discontinue criterion is met. If the child makes an INCORRECT response to Cow, Popcorn, the computer will bring up another 2-stimulus item: Rabbit, Corn. If a child does not succeed with the first item of a set, the second item will be presented. If a child is incorrect on both parts of an item set, the test is discontinued.
List Sorting Instructions

For the practice items, participants have three tries to answer correctly; these are indicated by trials 1, 2 or 3 below. The examiner records the participant’s performance on the examiner screen by indicating which trial the participant answered correctly. The last choice on the examiner screen indicates that the participant never answered correctly. When this happens, the test will be discontinued and no more items will be presented.

1-List Condition

Introduction

Say: I’m going to show you some pictures one at a time on the screen. After each set of pictures, you will see a blank screen. When you see the blank screen, I want you to tell me the names of the pictures in size order from smallest to biggest. For example, if I show you a motorcycle, a bus, and a car, you would say: motorcycle, car, bus. Do you have any questions? Let’s practice. Click START TEST.

1-List Practice Item 1:

Trial 1: Click PLAY; when screen is blank, say: Tell me the animals in size order.

Correct Response:

If participant says DOG, HORSE, say: That’s right. Click #1; then click NEXT. Computer automatically goes to the next item.

Incorrect Response:

If participant does not say DOG, HORSE, say: Let’s try that again.

Trial 2: say: You saw a DOG and a HORSE; the DOG is smaller than the HORSE. Tell me the animals in size order. If participant says DOG, HORSE, say: That’s right. Click #2; then click NEXT. Computer automatically goes to next item.

If participant does not say DOG, HORSE, say: Let’s try that one more time.

Trial 3: Click PLAY again; when screen is blank, say: You saw a DOG and a HORSE; the DOG is smaller than the HORSE. Tell me the animals in size order. Now you tell me the smaller animal (wait for response). Now tell me the bigger animal. If participant says DOG, HORSE, say: That’s right. Click #3; then click NEXT. Computer automatically goes to next item.
If participant answers one or both parts of the question incorrectly after three trials, click #4; then click NEXT. Test will be discontinued.

1-List Practice Item 2:
Say: Now we are going to do some more. Are you ready?

Trial 1: Click PLAY; when the screen is blank, say: Tell me the animals in size order, starting with the smallest animal.
Correct Response:
If participant says RABBIT, SHEEP, ELEPHANT, say: That's right. Click #1; then click NEXT. Computer automatically goes to next item.
Incorrect Response:
If participant does not say RABBIT, SHEEP, ELEPHANT, say: Let’s try that again.

Trial 2: say: You saw a RABBIT, SHEEP and ELEPHANT; the RABBIT is smaller than the SHEEP, and the SHEEP is smaller than the ELEPHANT. The RABBIT is the smallest animal, the SHEEP is the next biggest animal, and the ELEPHANT is the biggest animal. Now, tell me the animals in size order, starting with the smallest animal. If participant says RABBIT, SHEEP, ELEPHANT, say: That’s right. Click #2; then click NEXT. Computer automatically goes to next item.
If participant does not say RABBIT, SHEEP, ELEPHANT, say: Let’s try that once more.

Trial 3: Click PLAY again; when screen is blank, say: You saw a RABBIT, SHEEP and ELEPHANT; the RABBIT is smaller than the SHEEP, and the SHEEP is smaller than the ELEPHANT. The RABBIT is the smallest animal, the SHEEP is the next biggest animal, and the ELEPHANT is the biggest animal. Now, tell me the animals in size order, starting with the smallest animal. If participant says RABBIT, SHEEP, ELEPHANT, say: That’s right. Click #3; then click NEXT. Computer automatically goes to next item.
If participant answers any part of the question incorrectly after three trials, click #4; then click NEXT. Test will be discontinued.
1-List Test Items:

Say: Let's look at some more pictures. Remember, after you see the pictures you will see a blank screen. Once you see this blank screen, I want you to tell me what you just saw in size order from smallest to biggest. It is important to pay attention to the size of the object on the screen when putting things in size order from smallest to biggest. Click NEXT.

Click PLAY; say (for the first item and then only as necessary): Once you see the blank screen, tell me what you just saw in size order from smallest to largest. Mark the item CORRECT (Yes) or INCORRECT (No) based on the participant’s response.

If the participant makes a CORRECT response, the computer will bring up the Pumpkin, Strawberry, Banana series and continue until the participant completes all the items or until a discontinue criterion is met.

If the participant makes an INCORRECT response, the computer will bring up another 2-stimulus series: Bird, Cow. If a participant does not succeed with the first item of a set, the second item of that set will be presented (see the tables at end of the introduction for a complete list of 1-List and 2-List test items).
2-List Condition

Introduction

Say: *We're going to look at more pictures. This time, you will see both food and animals in a set of pictures. I'd like you to tell me the food first, and then the animals, in size order from smallest to biggest. It is important to pay attention to the size of the object on the screen when putting things in size order from smallest to biggest. Let's start by looking at some more pictures together.* Click NEXT.

2-List Practice Item 1:

**Trial 1:** Click PLAY; when screen is blank, say: *Tell me the food, then the animal.*

- **Correct Response:**
  
  If participant says BANANA, BEAR, say: *That's right.* Click #1; then click NEXT. Computer automatically goes to next item.
  
  - **Incorrect Response:**
    
    If participant does not say BANANA, BEAR, say: *Let's try that again.*
    
    **Trial 2:** say: *The BEAR is an animal; the BANANA is a food. Now you tell me the food first and then the animal.* If participant says BANANA, BEAR, say: *That's right.* Click #2; then click NEXT. Computer automatically goes to next item.
    
    If participant does not say BANANA, BEAR, say: *Let's try that once more.*
    
    **Trial 3:** Click PLAY again; when screen is blank, say: *The BEAR is an animal; the BANANA is a food. Now you tell me the food first and then the animal.* If participant says BANANA, BEAR, say: *That's right.* Click #3; then click NEXT. Computer automatically goes to next item.
    
    If participant answers any part of the question incorrectly after three trials, click #4; then click NEXT. Test will be discontinued.

2-List Practice Item 2:

Say: *Now we are going to do some more.*

**Trial 1:** Click PLAY; when screen is blank, say: *Tell me the food in size order from smallest to biggest, and then tell me the animals in size order from smallest to biggest.*
Correct Response:

If participant says PINEAPPLE, FROG, TIGER, say: That's right. Click #1; then click NEXT. Computer automatically goes to next item.

Incorrect Response:

If participant does not say PINEAPPLE, FROG, TIGER, say: Let's try that again.

**Trial 2:** say: You saw a frog, a pineapple, and a tiger. The pineapple is a food; the frog is the smallest animal, and the tiger is the biggest animal. Now, you tell me the food in size order starting with the smallest food, and then the animals in size order, from smallest to biggest. If participant says PINEAPPLE, FROG, TIGER, say: That's right. Click #2; then click NEXT. Computer automatically goes to next item.

If participant does not say PINEAPPLE, FROG, TIGER, say: Let's try that once more.

**Trial 3:** Click PLAY again; when screen is blank, say: You saw a frog, a pineapple, and a tiger. The pineapple is a food; the frog is the smallest animal, and the tiger is the biggest animal. Now, you tell me the food in size order starting with the smallest food, and then the animals in size order, from smallest to biggest. If participant says PINEAPPLE, FROG, TIGER, say: That's right. Click #3; then click NEXT. Computer automatically goes to next item.

If participant answers any part of the question incorrectly after three trials, click #4; then click NEXT. Test will be discontinued.

2-List Test Items

Say (for the first item and then only as necessary): Let's look at some more pictures. Remember, after you see the pictures, you will see a blank screen. Once you see this blank screen, tell me the foods first in size order from smallest to biggest, then the animals, in size order from smallest to biggest. Click PLAY; mark the item CORRECT (Yes) or INCORRECT (No) based on the participant's response.

If the participant makes a CORRECT response to Cow, Popcorn, the computer will bring up a 3-stimulus item: Elephant, Pumpkin, Duck, and continue until the participant completes all the items or until a discontinue criterion is met.

If the participant makes an INCORRECT response to Cow, Popcorn, the computer will bring up another 2-stimulus item: Rabbit, Corn. If a participant does not succeed with the first item of a set, the second item will be presented. If a participant is incorrect on both parts of an item set, the test is discontinued.
Dimensional Change Card Sort

Materials:
Laptop
Monitor
Keyboard

Description:
The Dimensional Change Card Sort is a measure of cognitive flexibility and attention. Two target pictures are presented that vary along two dimensions (e.g., shape and color). Participants are asked to match a series of bivalent test pictures (e.g., yellow balls and blue trucks) to the target pictures, first according to one dimension (e.g., color) and then, after a number of trials, according to the other dimension (e.g., shape).

The relevant dimension for sorting is indicated by a cue word (e.g., “shape” or “color”) that appears on the screen and, for younger children, is spoken by a prerecorded voice.

Practice items use white and brown colors and a Rabbit and Sailboat as shapes. Test items use blue and yellow colors and a Ball and Truck as shapes.

All instructions are on the screen.
The examiner reads them to and/or with the participant and points out the relevant aspects of the stimuli on the screen. The next screen appears when either the examiner or participant makes a choice on the screen.

Practice Trials:
The participant is given four practice trials with each dimension. If the participant responds incorrectly, the computer prompts him/her to choose the correct image.

If the participant does not respond after five seconds, the examiner should prompt him/her, saying: “Choose one of the pictures” in English, and “Selecciona una de las imágenes” (ages 3-17 years) or “Seleccione una de las imágenes” (ages 18-85 years) in Spanish.

Practice Rules:
• The participant must get at least three out of four practice trials correct to advance to the test trials.
• If the participant gets fewer than three out of four practice trials correct, he/she will complete up to two more sets of four practice trials, with the same cutoff to advance to the test trials.
• If the participant does not meet the cutoff, the task will automatically discontinue (i.e., will advance to final screen).
Test Trials:
The examiner should not prompt the participant to respond during the test trials. If the participant does not respond after ten seconds, the program will automatically advance to the next test trial.

During the test trials, 3-7 year olds first complete a set of five trials sorting according to color. If these participants succeed in four of the five test trials, the program advances to a set of five trials sorting according to shape. If these participants do not get four out of five test trials correct, the program will automatically terminate. If these participants meet criterion on the second set, they will then complete the mixed block, consisting of 30 shape/color trials.

Participants 8-85 years of age complete a mixed block of items consisting of 30 shape/color trials.
## DCCS Instructions

This table outlines the item content and the actions for the examiner.

<table>
<thead>
<tr>
<th>Practice Intro</th>
<th><strong>Child’s screen written content</strong></th>
<th><strong>Examiner (E) Actions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>We’re going to play a matching game with colors and shapes.</td>
<td>Reads screen; then clicks NEXT on E’s screen.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SHAPE Intro</th>
<th><strong>Child’s screen written content</strong></th>
<th><strong>Examiner (E) Actions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>We’ll play the SHAPE game first. In the SHAPE game, choose the picture that’s the same SHAPE as the picture in the middle of the screen. If it’s a BOAT, choose this picture.</td>
<td>Points to BOAT; demonstrates use of index finger.</td>
<td></td>
</tr>
<tr>
<td>If it is a RABBIT, choose that picture.</td>
<td>Points to RABBIT; demonstrates use of keyboard.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transition</th>
<th><strong>Child’s screen written content</strong></th>
<th><strong>Examiner (E) Actions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Now you try.</td>
<td><strong>Child’s screen written content</strong></td>
<td><strong>Examiner (E) Actions</strong></td>
</tr>
<tr>
<td>Keep your eyes on the star. Answer as fast as you can without making mistakes. If you make a mistake, just keep going.</td>
<td>Reads screen; clicks NEXT on E’s screen.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shape Practice</th>
<th><strong>Child’s screen written content</strong></th>
<th><strong>Examiner (E) Actions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>4 items sorted by shape</td>
<td>Chooses BOAT.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>More practice, if needed</th>
<th><strong>Child’s screen written content</strong></th>
<th><strong>Examiner (E) Actions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Let’s practice that some more. In the SHAPE game, choose the picture that’s the same SHAPE as the picture in the middle of the screen. If it’s a BOAT, choose this picture.</td>
<td>Chooses RABBIT.</td>
<td></td>
</tr>
<tr>
<td>If it’s a RABBIT, choose that picture.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transition</th>
<th><strong>Child’s screen written content</strong></th>
<th><strong>Examiner (E) Actions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Now you try.</td>
<td><strong>Child’s screen written content</strong></td>
<td><strong>Examiner (E) Actions</strong></td>
</tr>
<tr>
<td>Keep your eyes on the star. Answer as fast as you can without making mistakes. If you make a mistake, just keep going.</td>
<td>Reads screen; then clicks NEXT.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shape Practice again</th>
<th><strong>Child’s screen written content</strong></th>
<th><strong>Examiner (E) Actions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>4 items sorted by shape</td>
<td>Chooses BOAT.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>More practice, if needed</th>
<th><strong>Child’s screen written content</strong></th>
<th><strong>Examiner (E) Actions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Let’s practice that some more. In the SHAPE game, choose the picture that’s the same SHAPE as the picture in the middle of the screen. If it’s a BOAT, choose this picture.</td>
<td>Chooses RABBIT.</td>
<td></td>
</tr>
<tr>
<td>If it’s a RABBIT, choose that picture.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transition</th>
<th><strong>Child’s screen written content</strong></th>
<th><strong>Examiner (E) Actions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Now you try.</td>
<td><strong>Child’s screen written content</strong></td>
<td><strong>Examiner (E) Actions</strong></td>
</tr>
<tr>
<td>Keep your eyes on the star. Answer as fast as you can without making mistakes. If you make a mistake, just keep going.</td>
<td>Reads screen; then clicks NEXT.</td>
<td></td>
</tr>
<tr>
<td>Child's screen written content</td>
<td>Examiner (E) Actions</td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Shape Practice</strong> <strong>again</strong></td>
<td>4 items sorted by shape</td>
<td></td>
</tr>
<tr>
<td><strong>COLOR intro</strong></td>
<td>We can also match by COLOR. In the COLOR game, choose the picture that’s the same COLOR as the picture in the middle of the screen. If it’s BROWN, choose this picture.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Points to, then chooses, BROWN picture.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If it’s WHITE, choose that picture.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Points to, then chooses, WHITE picture.</td>
<td></td>
</tr>
<tr>
<td><strong>Transition</strong></td>
<td>Now you try. Keep your eyes on the star. Answer as fast as you can without making mistakes. If you make a mistake, just keep going.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reads screen; then clicks NEXT on examiner screen.</td>
<td></td>
</tr>
<tr>
<td><strong>Color Practice</strong></td>
<td>4 items sorted by color</td>
<td></td>
</tr>
<tr>
<td><strong>More practice, if needed</strong></td>
<td>Let’s practice some more. In the COLOR game, choose the picture that is the same COLOR as the picture in the middle of the screen. If it’s WHITE, choose this picture.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chooses WHITE picture.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If it’s BROWN, choose that picture.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chooses BROWN picture.</td>
<td></td>
</tr>
<tr>
<td><strong>Transition</strong></td>
<td>Now you try. Keep your eyes on the star. Answer as fast as you can without making mistakes. If you make a mistake, just keep going.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reads screen; then clicks NEXT on E's screen.</td>
<td></td>
</tr>
<tr>
<td><strong>Color Practice</strong> <strong>again</strong></td>
<td>4 items sorted by color</td>
<td></td>
</tr>
<tr>
<td><strong>More practice, if needed</strong></td>
<td>Let’s practice some more. In the COLOR game, choose the picture that is the same COLOR as the picture in the middle of the screen. If it’s WHITE, choose this picture.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chooses WHITE picture.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If it’s BROWN, choose that picture.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chooses BROWN picture.</td>
<td></td>
</tr>
<tr>
<td><strong>Transition</strong></td>
<td>Now you try. Keep your eyes on the star. Answer as fast as you can without making mistakes. If you make a mistake, just keep going.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reads screen; then clicks NEXT on E's screen.</td>
<td></td>
</tr>
<tr>
<td><strong>Color Practice</strong> <strong>again</strong></td>
<td>4 items sorted by color</td>
<td></td>
</tr>
<tr>
<td><strong>COLOR and SHAPE intro</strong></td>
<td>Now, we’re going to play with some different SHAPES and COLORS. This time we’ll use BALLS and TRUCKS that are YELLOW and BLUE.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chooses BLUE picture.</td>
<td></td>
</tr>
<tr>
<td><strong>Pre-switch intro</strong></td>
<td>Let’s start with the COLOR game. Remember the COLOR game? In the COLOR game, choose the picture that’s the same COLOR as the picture in the middle of the screen. If it’s a BLUE one, choose this picture.</td>
<td></td>
</tr>
<tr>
<td>Child's screen written content</td>
<td>Examiner (E) Actions</td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------------</td>
<td></td>
</tr>
<tr>
<td>And if it's a YELLOW one, choose that picture.</td>
<td>Chooses YELLOW picture.</td>
<td></td>
</tr>
<tr>
<td><strong>Transition</strong></td>
<td><strong>Examiner (E) Actions</strong></td>
<td></td>
</tr>
<tr>
<td>Now, you try.</td>
<td>Reads screen; then clicks NEXT on E's screen.</td>
<td></td>
</tr>
<tr>
<td>Keep your eyes on the star.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Answer as fast as you can without making mistakes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If you make a mistake, just keep going.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Color items</strong></td>
<td>5 items sorted by color (if child does not get 4 of 5 correct, test terminates).</td>
<td></td>
</tr>
<tr>
<td><strong>Post-switch intro</strong></td>
<td>Now we’re going to play the SHAPE game. Remember the SHAPE game? In the SHAPE game, choose the picture that’s the same SHAPE as the picture in the middle of the screen. If it’s a TRUCK, choose this picture.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chooses TRUCK.</td>
<td></td>
</tr>
<tr>
<td>And if it's a BALL, choose that picture.</td>
<td>Chooses BALL.</td>
<td></td>
</tr>
<tr>
<td><strong>Transition</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Now, you try.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keep your eyes on the star.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Answer as fast as you can without making mistakes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If you make a mistake, just keep going.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Shape items</strong></td>
<td>5 items sorted by shape (if child does not get 4 of 5 correct, test terminates).</td>
<td></td>
</tr>
<tr>
<td><strong>Intro Mixed Items</strong></td>
<td>We can also play both games together. Remember, when you see or hear the word SHAPE, choose the picture that’s the same SHAPE as the picture in the middle of the screen. If it’s a TRUCK, choose this picture.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chooses TRUCK.</td>
<td></td>
</tr>
<tr>
<td>And if it's a BALL, choose that picture.</td>
<td>Chooses BALL.</td>
<td></td>
</tr>
<tr>
<td>When you see or hear the word COLOR, choose the picture that’s the same COLOR as the picture in the middle of the screen. If it’s a BLUE one, choose this picture.</td>
<td>Chooses BLUE picture.</td>
<td></td>
</tr>
<tr>
<td>And if it's a YELLOW one, choose that picture.</td>
<td>Chooses YELLOW picture.</td>
<td></td>
</tr>
<tr>
<td><strong>Transition</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Now, you try.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keep your eyes on the star.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Answer as fast as you can without making mistakes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If you make a mistake, just keep going.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test items</strong></td>
<td>30 mixed items.</td>
<td></td>
</tr>
</tbody>
</table>
**DCCS Instructions**

This table outlines the item content and the actions for the examiner.

<table>
<thead>
<tr>
<th>Practice Intro - all ages</th>
<th>Participant’s screen written content</th>
<th>Examiner (E) Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>We’re going to play a matching game with colors and shapes.</td>
<td>Reads screen; then clicks NEXT on E’s screen.</td>
</tr>
</tbody>
</table>

| SHAPE Intro              | We’ll play the SHAPE game first. In the SHAPE game, choose the picture that’s the same SHAPE as the picture in the middle of the screen. If it’s a BOAT, choose this picture. | Points to BOAT; demonstrates use of index finger. |
|                         | If it’s a RABBIT, choose that picture. | Points to RABBIT; demonstrates use of keyboard. |

| Transition               | Now you try.  
Keep your eyes on the star.  
Answer as fast as you can without making mistakes.  
If you make a mistake, just keep going. | Reads screen; then clicks NEXT on E’s screen. |

| Shape Practice again     | 4 items sorted by shape |  |

| More practice, if needed | Let’s practice that some more. In the SHAPE game, choose the picture that’s the same SHAPE as the picture in the middle of the screen. If it’s a BOAT, choose this picture. | Chooses BOAT. |
|                         | If it’s a RABBIT, choose that picture. | Chooses RABBIT. |

| Transition               | Now you try.  
Keep your eyes on the star.  
Answer as fast as you can without making mistakes.  
If you make a mistake, just keep going. | Reads screen; then clicks NEXT on E’s screen. |

| Shape Practice again     | 4 items sorted by shape |  |

| More practice, if needed | Let’s practice that some more. In the SHAPE game, choose the picture that’s the same SHAPE as the picture in the middle of the screen. If it’s a BOAT, choose this picture. | Chooses BOAT. |
|                         | If it’s a RABBIT, choose that picture. | Chooses RABBIT. |

| Transition               | Now you try.  
Keep your eyes on the star.  
Answer as fast as you can without making mistakes.  
If you make a mistake, just keep going. | Reads screen; then clicks NEXT on E’s screen. |
<table>
<thead>
<tr>
<th>Shape Practice again</th>
<th>4 items sorted by shape</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COLOR Intro</strong></td>
<td>We can also match by COLOR. In the COLOR game, choose the picture that’s the same COLOR as the picture in the middle of the screen. If it’s BROWN, choose this picture.</td>
</tr>
<tr>
<td></td>
<td>If it’s WHITE, choose that picture.</td>
</tr>
<tr>
<td><strong>Transition</strong></td>
<td>Now you try. Keep your eyes on the star. Answer as fast as you can without making mistakes. If you make a mistake, just keep going.</td>
</tr>
<tr>
<td><strong>Color Practice</strong></td>
<td>4 items sorted by color</td>
</tr>
<tr>
<td>More practice, if needed</td>
<td>Let’s practice some more. In the COLOR game, choose the picture that’s the same COLOR as the picture in the middle of the screen. If it’s WHITE, choose this picture.</td>
</tr>
<tr>
<td></td>
<td>If it’s BROWN, choose that picture.</td>
</tr>
<tr>
<td><strong>Transition</strong></td>
<td>Now you try. Keep your eyes on the star. Answer as fast as you can without making mistakes. If you make a mistake, just keep going.</td>
</tr>
<tr>
<td><strong>Color Practice again</strong></td>
<td>4 items sorted by color</td>
</tr>
<tr>
<td>More practice, if needed</td>
<td>Let’s practice some more. In the COLOR game, choose the picture that’s the same COLOR as the picture in the middle of the screen. If it’s WHITE, choose this picture.</td>
</tr>
<tr>
<td></td>
<td>If it’s BROWN, choose that picture.</td>
</tr>
<tr>
<td><strong>Transition</strong></td>
<td>Now you try. Keep your eyes on the star. Answer as fast as you can without making mistakes. If you make a mistake, just keep going.</td>
</tr>
<tr>
<td><strong>Color Practice again</strong></td>
<td>4 items sorted by color</td>
</tr>
<tr>
<td>More practice, if needed</td>
<td>Let’s practice some more. In the COLOR game, choose the picture that’s the same COLOR as the picture in the middle of the screen. If it’s WHITE, choose this picture.</td>
</tr>
<tr>
<td></td>
<td>If it’s BROWN, choose that picture.</td>
</tr>
<tr>
<td><strong>Transition</strong></td>
<td>Now you try. Keep your eyes on the star. Answer as fast as you can without making mistakes. If you make a mistake, just keep going.</td>
</tr>
<tr>
<td><strong>Test item intro</strong></td>
<td>Now we’re going to play both games together. Remember when you see the word SHAPE, choose the picture that’s the same SHAPE as the picture in the middle of the screen. When you see the word COLOR, choose the picture that’s the same COLOR as the picture in the middle of the screen.</td>
</tr>
<tr>
<td><strong>Examiner (E) Actions</strong></td>
<td>Points; then chooses BROWN picture.</td>
</tr>
<tr>
<td></td>
<td>Points; then chooses WHITE picture.</td>
</tr>
<tr>
<td></td>
<td>Reads screen; then clicks NEXT on E’s screen.</td>
</tr>
<tr>
<td></td>
<td>Points; then chooses WHITE picture.</td>
</tr>
<tr>
<td></td>
<td>Reads screen; then clicks NEXT on E’s screen.</td>
</tr>
<tr>
<td></td>
<td>Points; then chooses BROWN picture.</td>
</tr>
<tr>
<td></td>
<td>Reads screen; then clicks NEXT on E’s screen.</td>
</tr>
<tr>
<td>Transition</td>
<td>Participant’s screen written content</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Now you try.</td>
</tr>
<tr>
<td></td>
<td>Keep your eyes on the star.</td>
</tr>
<tr>
<td></td>
<td>Answer as fast as you can without making mistakes.</td>
</tr>
<tr>
<td></td>
<td>If you make a mistake, just keep going.</td>
</tr>
<tr>
<td>Test items</td>
<td>30 mixed items</td>
</tr>
</tbody>
</table>
Pattern Comparison Processing Speed

Materials:
Laptop & Monitor
Speakers & Keyboard
Ball (for some participants to hold in non-dominant hand)

Description:
This task is designed to measure processing speed. The test itself takes only 90 seconds and requires participants to discern whether two side-by-side pictures are the same or not. Younger children make this decision by choosing either a smiley face (corresponding to a "yes" response) or a frown face (corresponding to a "no" response). Older children and adults make this decision with "yes" or "no" buttons on the screen.

Practice Items:
Young children are administered two demonstration items and five practice items; older children and adults are administered six practice items. In English, separate instructions are provided for participants ages 3-7 and those ages 8-85 years; in Spanish, separate instructions are provided for participants ages 3-7, ages 8-17, and ages 18-85 years.

All participants use the arrow keys on the keyboard to make their choice. The mouse should be moved away from the participant. The practice items are not timed. If a participant (child or adult) continues to make an error after being corrected on two practice items, the test will discontinue.

During practice items only, a recorded voice will follow each item presentation:

If the item is correct, the computer will say: Great job! or That’s right in English and ¡Muy bien! in Spanish.
If the item is incorrect, the examiner will say: Let’s try again in English and Vamos a intentarlo otra vez in Spanish; the computer itself will say why the item is incorrect. The item will appear a second time.

Prompts: Some participants (children and adults) need reminders to stay on task. The examiner may give prompts, although fewer are better as this is a timed task. Each prompt should be succinct.

Examples in English are: look at the screen, is this the same, yes or no, remember to choose a button, remember the smiley means yes and the frown means no, remember to choose as quickly as you can.

Examples in Spanish are: mira la pantalla, ¿es igual?, ¿es igual, sí o no?, acuérdate de elegir un botón, acuérdate de que la carita sonriente significa ‘sí’ y la carita triste significa ‘no’, acuérdate de elegir lo más rápido que puedas for children and mira la pantalla, ¿es igual, sí o no?, acuérdese de elegir un botón, acuérdese de elegir lo más rápido que pueda for adults.

Handedness: All participants (child and adult) will be asked to use the index finger of their dominant hand.
**Pattern Comparison Instructions**

**Say:** I would like you to use the pointer (index) finger (show appropriate finger) on this (dominant) hand to answer. If you want you can hold this ball in your other (non-dominant) hand so that you don't get mixed up.

**Say:** Let’s look at these two faces. One of them is a SMILEY face (point) and the other is a FROWN face (point).

![Smiley and Frown Faces](image)

**Say:** Now I am going to show you some more pictures. On each screen, there will be two pictures. Sometimes the pictures look alike or the same, and sometimes the pictures do not look alike and are NOT the same. When the pictures look alike or the same, you should choose the SMILEY face (point to left arrow). When they do NOT look alike or the same, you should choose the FROWN face (point to right arrow).

When the child understands the two faces, say: **Let’s choose the SMILEY face and then look at some pictures together. Again, demonstrate how to use keyboard.**

**Ages 3-7 Demonstration Item 1:**

![Two Snowflakes](image)

**Say:** Look at the boxes on the screen; in the boxes are two pictures – this picture (point to left box) and this picture (point to right box). These two pictures look alike or the same, so we’ll choose the SMILEY face. Let’s choose the SMILEY face together. Demonstrate how to use keyboard. Computer says: **Great job!** Next item will appear.
Ages 3-7 Demonstration Item 2:

Say: Look at these pictures here. This picture (point to left box) and this picture (point to right box) do NOT look alike or the same. This picture (point) is purple but this picture (point) is orange. This means the pictures are NOT alike, not the same. So we'll choose the FROWN face. Let's choose the FROWN face together. Demonstrate. Computer says: Great job! Next item will appear.

Say: Now you do some to practice. Your job is to choose the SMILEY face if the pictures look alike or are the same and to choose the FROWN face if the pictures do not look alike or are not the same.

Ages 3-7 Practice Item 1:

Say: Are these the same? Remember, choose the SMILEY face if they look alike or are the same and chose the FROWN face if they do not look alike or are NOT the same. (Discontinue questions or prompting when child understands instructions.)

If correct (SMILEY face), computer says: Great job! Next item will appear.

If incorrect (FROWN face), computer says: The pictures look alike, the same. Both pictures are flowers that are the same size and color, so choose the SMILEY face. SMILEY face will flash; item will stay on screen. Say: Let’s try again. Are these the same? If child chooses correctly, computer will say: Great job! Next item will appear.

If child chooses incorrectly another time, computer moves to next practice item after repeating explanation above.
Ages 3-7 Practice Item 2:

Say:  Are these the same? Choose the SMILEY face if they look alike or are the same and choose the FROWN face if they do not look alike and are NOT the same. (Discontinue questions or prompting when the child understands instructions.)

If correct (FROWN face), computer says: Great job! Next item will appear.

If incorrect (SMILEY face), computer says: These pictures do not look alike and are NOT the same. One picture [point] is a flower with a stem and one picture [point] is only the top of a flower, with no stem. Choose the FROWN face. FROWN face will flash; item will stay on screen. Say: Let’s try again. Are these the same? If child chooses correctly, computer will say: Great job! Next item will appear.

If child chooses incorrectly another time, computer moves to next practice item after repeating explanation above.

Ages 3-7 Practice Item 3:

Say: Are these the same? Choose the SMILEY face if they look alike and are the same and choose the FROWN face if they do not look alike and are NOT the same. (Discontinue questions or prompting when child understands instructions.)

If correct (SMILEY face), computer says: Great job! Next item will appear.

If incorrect (FROWN face), computer says: These pictures look alike, the same. Both are pictures of a present or gift box, so choose the SMILEY face. SMILEY face will flash; item will stay on screen. Say: Let’s try again. Are these the same? If child chooses correctly, computer will say: Great job! Next item will appear.

If child chooses incorrectly another time, computer moves to next practice item after repeating explanation above.
Ages 3-7 Practice Item 4:

Say: Are these the same? Choose the SMILEY face if they look alike or are the same and choose the FROWN face if they do not look alike or are NOT the same. (Discontinue questions or prompting when child understands instructions.)

If correct (FROWN face), computer says: Great job! Next item will appear.

If incorrect (SMILEY face), computer says: These pictures do not look alike and are NOT the same. One flower is purple and the other flower is red; so choose the FROWN face. FROWN face will flash; item will stay on screen. Say: Let's try again. Are these the same? If child chooses correctly, computer will say: Great job! Next item will appear.

If child chooses incorrectly another time, computer moves to next practice item after repeating explanation above.

Ages 3-7 Practice Item 5:

Say: Are these the same? Choose the SMILEY face if they look alike and are the same and choose the FROWN face if they do not look alike or are not the same. (Discontinue questions or prompting when child understands instructions.)

If correct (SMILEY face), computer says: Great job! Practice items are complete.

If incorrect (FROWN face), computer says: These pictures look alike. Both are pictures of red flowers, so choose the SMILEY face. SMILEY face will flash; item will stay on screen. Say: Let's try again. Are these the same? If child chooses correctly, computer will say: Great job! Practice items are complete.

If child chooses incorrectly another time, computer completes the practice items after repeating explanation above.
Test Items:

**NOTE:** If the child has not correctly chosen the SMILEY or FROWN face after both trials on two of the five practice items, testing will automatically be discontinued and computer will move on to the next test.

Otherwise, say: Now we’ll do some more. Remember, choose the SMILEY face if the pictures look alike or are the same and choose the FROWN face if the pictures do not look alike and are NOT the same. Make a choice as quickly as you can. Click NEXT to start test and, if necessary, give prompts.

When 90 seconds of testing time has elapsed, test will end (if child is working on an item when time is up, he/she will be permitted to complete it).
Pattern Comparison Instructions

Say: I am going to show you some pictures. On each screen there are two pictures. Sometimes the two pictures are the same, and sometimes the two pictures are NOT the same. If the pictures look the same, choose the YES button. If they do NOT look the same, choose the NO button. If you make a mistake during the practice, you will hear a message to try again. I would like you to use your RIGHT/LEFT (dominant hand) index finger (show appropriate finger) to respond.

If child or adult is having trouble using only one hand, give him/her a ball to hold in non-dominant hand during task.

Say: Let's begin our practice. Click NEXT.

Ages 8-85 Practice Item 1:

Say: Are these the same?
If correct (YES), computer says: That's right! Next item will appear.

If incorrect (NO), computer says: These pictures look alike or are the same; both pictures are flowers, so choose YES. YES will flash; item will stay on screen. Say: Let's try again. Are these the same? If participant chooses correctly, computer will say: Great job! Next item will appear.

If participant chooses incorrectly another time, computer moves to next practice item after repeating explanation above.

Ages 8-85 Practice Item 2:
Say: Are these the same? (Discontinue prompts when participant understands instructions.)

If correct answer (NO), computer says: That’s right! Next item will appear.

If incorrect (YES), computer says: These pictures do not look alike and are not the same; one picture (point) is a flower with a stem. The other picture (point) is the top of a flower, with no stem. They are NOT the same; choose NO. NO will flash; item will stay on screen. Say: Let’s try again. Are these the same? If participant chooses correctly, computer will say: Great job! Next item will appear.

If participant chooses incorrectly another time, computer moves to next practice item after repeating explanation above.

Ages 8-85 Practice Item 3:

Say: Are these the same? (Discontinue prompts when participant understands instructions.)

If correct answer (NO), computer says: That’s right! Next item will appear.

If incorrect (YES), computer says: These pictures do not look alike, are NOT the same. One (point) is a picture of one present and the other (point) is a picture of many presents. They are NOT the same, so choose NO. NO will flash; item will stay on screen. Say: Let’s try again. Are these the same? If participant chooses correctly, computer will say: Great job! Next item will appear.

If participant chooses incorrectly another time, computer moves to next practice item after repeating explanation above.

Ages 8-85 Practice Item 4:
Say: Are these the same? (Discontinue prompts when participant understands instructions.)
If correct (YES), computer says: That’s right! Next item will appear.
If incorrect (NO), computer says: These pictures are the same; both are pictures of one present, so choose YES. YES will flash; item will stay on screen. Say: Let’s try again. Are these the same? If participant chooses correctly, computer will say: Great job! Next item will appear.
   If participant chooses incorrectly another time, computer moves to next practice item after repeating explanation above.

Ages 8-85 Practice Item 5:

Say: Are these the same? (Discontinue prompts when participant understands instructions.)
If correct answer (NO), computer says: That’s right! Next item will appear.
If incorrect (YES), computer says: These pictures are NOT the same; one (point) is a picture of a purple flower. The other (point) is a picture of a red flower. They are NOT the same, so choose NO. NO will flash; item will stay on screen. Say: Let’s try again. Are these the same? If participant chooses correctly, computer will say: Great job! Next item will appear.
   If participant chooses incorrectly another time, computer moves to next practice item after repeating explanation above.

Ages 8-85 Practice Item 6:
Say: Are these the same? (Discontinue prompts when participant understands instructions.)

If correct (YES), computer says: That's right! Practice items are complete.

If incorrect (NO), computer says: These pictures look alike and are the same; both are pictures of red flowers, so choose YES. YES will flash; item will stay on screen. Say: Let's try again. Are these the same? If participant chooses correctly, computer will say: Great job! Practice items are complete.

If participant chooses incorrectly another time, computer completes the practice items after repeating explanation above.

Test Items:

NOTE: If the participant does not respond correctly after both trials on two of the six practice items, testing will automatically be discontinued and the computer will move on to the next test.

Otherwise, say: Now we'll do some more. Remember, use your right/left (dominant hand) index finger to respond. Choose YES if the pictures look the same and choose NO if they do NOT look the same. It is important that you choose as quickly as you can. Click NEXT to start test and, if necessary, give prompts.

When 90 seconds of testing time has elapsed, the test will end (if a participant is working on an item when time is up, he/she will be permitted to complete it).
Picture Sequence Memory

Materials:
Laptop
Monitor and speakers
Mouse

Description:
In this measure of episodic memory, sequences of pictured objects and activities are presented in a particular order. The participants are asked to reproduce the sequence of pictures that is demonstrated.

Special Instructions:
For all participants, a demonstration sequence shows participants how to move the pictures on the screen. We call this a Training Sequence. After this, different practice sequences are given for participants of differing ages: 3-4, 5-6, 7, and 8-85 years, as well as different test sequences for participants of differing ages.

Examiners need to pay close attention to the instructions during both the practice and test sequences, since they involve many steps. The examiner’s screen provides a sequence title that lists the number of steps being presented (e.g., Play in the Park 9-step sequence). Before clicking PLAY, the examiner should note the number of steps to be played and read the applicable instructions.

Participants may respond by moving pictures on the screen into the gray boxes, or they may verbalize the picture labels as they move the pictures. If verbalizing the picture labels seems to interfere with the participant’s performance, the examiner should say: You don’t need to say the words/labels in English, or in Spanish, say: No hace falta que digas las palabras/los títulos (ages 3-17) or No hace falta que diga las palabras/los títulos (ages 18-85). If participants indicate that saying the labels helps them, the examiner may reassure them that they may say the labels if they wish.

If participants look away from the screen while the pictures are being presented, the examiner should remind them to: Watch the screen in English or in Spanish, Mira la pantalla (ages 3-17) or Mire la pantalla (ages 18-85).

Examiners should not allow participants to use the mouse to click on the screen while the pictures are being presented. If participants attempt to click on the screen while pictures are being presented or while the examiner is giving instructions, say: Do not use the mouse until I tell you that it is your turn in English or in Spanish, No uses el ratón hasta que yo te indique que es tu turno (ages 3-17) or No use el ratón hasta que yo le indique que es su turno (ages 18-85).
If necessary, remind participants to: Wait until I tell you before clicking on the screen in English, or in Spanish, No hagas clic en la pantalla hasta que yo te lo diga (ages 3-17) or No haga clic en la pantalla hasta que yo se lo diga (ages 18-85).

If the participant has difficulty using the mouse or is left-handed, he/she may point and the examiner may operate the mouse. The examiner should say something like the following to the participant, and should ensure the participant completely understands how the process will work. The examiner could say (in English): You point to the picture you want to move, then point to the grey box to which you want to move it. Then, I will move it there for you. (In Spanish): Señálame la imagen que quieres mover y después señálame el cuadro gris al que la quieres mover. Después, yo la moveré ahí por ti (ages 3-17) or Señáleme la imagen que quiere mover y después señáleme el cuadro gris al que la quiere mover. Después, yo la moveré ahí por usted (ages 18-85). If the examiner moves the mouse so the participant can respond with his/her left hand, the examiner must not move either the monitor or the laptop.

For the training sequence, and if the participant has difficulty with the mouse, the examiner and participant should be seated next to each other so they may both access the participant’s screen.

The participant should be instructed to use the mouse with the dominant hand. The examiner has a different screen from the participant.

NOTE: If your study includes retesting, during the retest, the computer will present one of two sequences (Go to the Fair and Work on the Farm) to minimize practice effects.
Picture Sequence Memory (PSM) Instructions

Introduction and Training Sequence
There are three steps in the training sequence:

**Step 1:** Moving pictures from the yellow box to the gray boxes.
**Step 2:** Moving pictures from the gray boxes back to the yellow box.
**Step 3:** Moving pictures between the gray boxes.

Examiner should click **PLAY** to start the training sequence and each time it needs to be repeated. Examiner should click **NEXT** only when finished with the training sequence and he/she is ready to move to the actual test items.

**Step 1: Moving pictures from the yellow box to gray boxes**
When first screen appears, say: **Now we are going to play a memory game, but first I am going to teach you how to move the pictures on this screen. Click PLAY.**

Say: **Here you see some pictures in a yellow box (‘picking flowers’ pictures). I want to show you how to move the pictures to the gray boxes. You can move pictures from this yellow box (point) to the gray boxes down here (point), like this. Click on the picture (click ‘cutting flowers’) in the yellow box; then click on the gray box you want to move it to (click on first gray box). Now you try with this picture (point to ‘vase with flowers’).**

**Correct Response:** Say: **That’s right!**

**Incorrect Response:** Say: **Click on this picture** (point to picture in yellow box). When participant clicks on picture, say: **Now click on this box** (point to empty gray box). When participant clicks on gray box, say: **See; you moved the picture from here (point to yellow box) to here (point to gray box).**

Reset pictures as they were before participant responded; click **PLAY and say: Now you try it again**

Repeat demonstration and/or correction of moving pictures until participant understands concept of moving pictures from yellow to gray boxes, up to a total of four times. Then, continue with Step 2.
**Step 2: Moving pictures from the gray boxes to the yellow box**

**Say:** You can also move pictures from the gray boxes (point) back to the yellow box (point), like this (move ‘cutting flowers’ back to yellow box). Now you move the other picture back to the yellow box (point to ‘vase with flowers’).

**Correct Response:** Say: That’s right!

**Incorrect Response:** Say: Click on this picture (point to ‘vase with flowers’). When participant clicks on picture, say: Now, click on the yellow box (point to yellow box). When participant clicks on yellow box, say: See; you moved the picture from here (point to original location) back to here (point to current location of picture). Move pictures back as they were before participant responded and say: Now you try it again.

Repeat demonstration and/or correction of moving pictures until participant understands concept of moving pictures from gray to yellow boxes, up to a total of four times. Then, continue with Step 3.

**Step 3: Moving pictures between the gray boxes**

Before beginning, examiner should move ‘vase with flowers’ to first gray box, then say: You can also move the pictures from one gray box to another, like this (click on ‘vase with flowers’ and then click on second gray box). First, you click on the picture in one gray box. Then, click on the gray box where you want the picture to go. Now you try it; move this picture from here (point to second gray box) to here (point to first gray box).

**Correct Response:** Say: That’s right!

**Incorrect Response:** Reset picture as it was originally and say: Click on this picture (point to picture in second gray box). When participant clicks on picture, say: Now, click on this box (point to empty gray box). When participant clicks on gray box, say: See, you moved the picture from this gray box (point to picture’s original location) to this one (point to picture’s current location). Reset pictures as they were before participant responded and say: Now you try it again.

Repeat demonstration and/or correction of moving pictures until participant understands concept of moving pictures between gray boxes, up to a total of four times.

**Practice Sequences:**

There are two practice sequences. If child does not succeed after two trials on first practice sequence of two pictures, PSM testing is discontinued. The second practice sequence has three pictures; if child succeeds in four or fewer trials, test sequence is started. If child does not succeed on the second practice sequence after four trials, PSM testing is discontinued.
As an introduction, say: Now, we’re going to play the memory game. I will show you some pictures on the computer. I want you to remember them; then, I want you to show them back to me in the same way I showed you. Click NEXT.

Practice Sequence 1:

Say: Now, I’m going to show you how to eat ice cream. Click PLAY: as pictures are presented, a recorded voice will say appropriate labels:

First, put a scoop on the cone.
Then, eat the ice cream.

Point to completed sequence; say: That’s how to eat ice cream. Once pictures are scrambled, say: Now, I want you to move the pictures to show me how to eat ice cream. I want you to show them back to me in the same way, in the same order that I showed you.

When child appears finished, ask: Are you finished? If child says YES and is correct, say: That’s right. You showed me how to eat ice cream. Let’s try another one. Click NEXT. If not correct, just click NEXT.

If child gives correct response: Practice 2, Have a Birthday Party, will appear on examiner’s screen.

If child gives incorrect response, say: Let’s try that again. I am going to show you again how to eat ice cream. Click PLAY. The pictures will again appear and recordings will play. Then say: That’s how to eat ice cream. I want you to put the pictures back the same way, in the same order that I just showed you. Now you try it again. If child does not succeed with Practice Sequence 1 after two trials, PSM testing is discontinued.

Practice Sequence 2:

Say: Now, I’m going to show you how to have a birthday party. Click PLAY. As pictures are presented, a recorded voice will say appropriate labels:

First, bake the cake.
Next, frost it.
And last, put on the candles.

Point to completed sequence; say: That’s how to have a birthday party. Once pictures are scrambled, say: Now, I want you to move the pictures to show me how to have a birthday party. I want you to show them back to me in the same way, in the same order that I showed you.
When child appears finished, ask: Are you finished? When child says YES or is correct, Say: That's right. You showed me how to have a birthday party. Let's try another one. Click NEXT. If not correct, just click NEXT.

If child gives correct response: The program will move on to the test sequences.

If child gives incorrect response, say: Let's try that again. I am going to show you again how to have a birthday party. Click PLAY. The pictures will again appear and recordings will play. Then say: That's how to have a birthday party. I want you to put the pictures the same way, in the same order that I just showed you. Now you try it again.

Repeat Practice Sequence 2, following the steps above, until the child responds correctly or sequence has been presented a total of four times. If child does not succeed with Practice Sequence 2 after four trials, PSM testing is discontinued.

Test Sequences:

Participants ages 3-4 will be presented with two trials of a 6-step sequence.

Introduce the task by saying, Now we are going to play a game with more pictures. Now I am going to show you how to play in the park. Click PLAY; as pictures are presented, a recorded voice will say appropriate labels:

- Open a picnic basket.
- Spread out the blanket.
- Sit on the blanket.
- Put a coin in the duck food machine.
- Get the duck food.
- Feed the ducks.

Point to completed sequence; say: That's how to play in the park. Once pictures are scrambled, say: Now, you move the pictures to show me how to play in the park. I want you to show them back to me in the same way, in the same order that I showed you.

When child appears finished, ask: Are you finished? If child says YES or is obviously finished, click NEXT. Introduce repeated sequence with the following statement: We're going to do the same pictures again. Everyone is asked to do this more than once. Click PLAY. Once pictures are scrambled, say: Now, you move the pictures to show me how to play in the park. I want you to show them back to me in the same way, in the same order that I showed you.

When child appears finished, ask: Are you finished? When child says YES or is obviously finished, click NEXT.

The test will terminate after two trials have been presented.
Picture Sequence Memory (PSM) Instructions

Introduction and Training Sequence

There are three steps to this training sequence:

Step 1: Moving pictures from the yellow box to the gray boxes.
Step 2: Moving pictures from the gray boxes back to the yellow box.
Step 3: Moving pictures between the gray boxes.

The examiner should click PLAY to start the training sequence and each time it needs to be repeated. The examiner should click NEXT only when finished with the training sequence and he/she is ready to move to the actual test items.

Step 1: Moving pictures from the yellow box to gray boxes

When the first screen appears, say: Now we are going to play a memory game but first I am going to teach you how to move the pictures on this screen. Click PLAY.

Say: Here you see some pictures in a yellow box (‘picking flowers’ pictures). I want to show you how to move the pictures to the gray boxes. You can move pictures from this yellow box (point) to the gray boxes down here (point), like this. Click on the picture (click ‘cutting flowers’) in the yellow box; then click on the gray box you want to move it to (click first gray box). Now you try with this picture (point to second picture, ‘vase with flowers’).

Correct Response: Say: That’s right!

Incorrect Response: Say: Click on this picture (point to picture in yellow box). When participant clicks on the picture, say: Now click on this box (point to empty gray box). When participant clicks gray box, say: See; you moved the picture from here (point to yellow box) to here (point to current location of picture).

Reset the pictures as they were before participant responded; click PLAY and say: Now you try it again.

Repeat demonstration and/or correction of moving pictures until participant understands concept of moving pictures from yellow to gray boxes, up to a total of four times. Then, continue with Step 2.
**Step 2: Moving pictures from the gray boxes to the yellow box**

Say: You can also move pictures from the gray boxes (point) back to the yellow box (point), like this (move ‘cutting flowers’ back to yellow box, pause). Now you move the other picture back to the yellow box (point to ‘vase with flowers’).

*Correct Response:* Say: That’s right!

*Incorrect Response:* Say: Click on this picture (point to ‘vase with flowers’). When participant clicks on picture, say: Now, click on the yellow box (point to yellow box). When participant clicks on yellow box, say: See; you moved the picture from here (point to original location) back to here (point to current location of picture). Move pictures back as they were before participant responded and say: Now you try it again.

Repeat demonstration and/or correction of moving pictures until participant understands concept of moving pictures from gray to yellow boxes, up to a total of four times. Then, continue with Step 3.

**Step 3: Moving pictures between the gray boxes**

Before beginning, the examiner should move ‘vase with flowers’ to first gray box. Then say: You can also move the pictures from one gray box to another, like this (click ‘vase with flowers’ and then click second gray box). First, you click on the picture in one gray box. Then, click on the gray box where you want the picture to go. Now you try it; move this picture from here (point to picture in second gray box) to here (point to first gray box).

*Correct Response:* Say: That’s right!

*Incorrect Response:* Reset picture as it was originally and say: Click on this picture (point to picture placed in second gray box). When participant clicks the picture, say: Now, click on this box (point to empty gray box). When participant clicks gray box, say: See, you moved the picture from this gray box (point to picture’s original location) to this one (point to picture’s current location). Reset pictures as they were before participant responded and say: Now you try it again.

Repeat demonstration and/or correction of moving pictures until participant understands concept of moving pictures between gray boxes, up to a total of four times.

**Practice sequences:** There are two practice sequences. The child has four trials to complete each sequence. If child succeeds in four trials or less, the next practice sequence or test sequence is presented. If child fails all four trials of either practice sequence, PSM testing is discontinued.

As an introduction, say: Now we are going to play the memory game. I will show you some pictures on the computer. I want you to remember them; then, I want you to show them back to me in the same way I showed you. Click NEXT.
Practice Sequence 1:

Say: Now, I’m going to show you how to have a birthday party. Click PLAY. As pictures are presented, a recorded voice will say the appropriate labels:

First, bake the cake.
Next, frost it.
And last, put on the candles.

Point to completed sequence and say: That’s how to have a birthday party. Once computer has scrambled pictures, say: Now, I want you to move the pictures to show me how to have a birthday party. I want you to show them back to me in the same way, in the same order that I showed you.

When child appears finished, ask: Are you finished? When child says YES or is obviously finished, click NEXT.

If child gives correct response: Practice Sequence 2, Go Camping, will appear on the examiner’s screen. Say: That’s right. You showed me how to have a birthday party. Let’s try another one.

If child gives incorrect response, say: Let’s try that again. I am going to show you again how to have a birthday party. Click PLAY. The pictures will again appear and voice recordings will play. Then say: That’s how to have a birthday party. I want you to put the pictures the same way, in the same order that I just showed you. Now you try it again.

Repeat Practice Sequence 1, following the steps above, until child responds correctly or sequence has been presented a total of four times. If child does not succeed with Practice Sequence 1 in four or fewer trials, PSM testing is discontinued.

Practice Sequence 2:

Say: Now, I’m going to show you how to go camping. Click PLAY. As pictures are presented, a recorded voice will say the appropriate labels:

First, put up the tent.
Then, go for a hike.
Then, catch a fish.
And last, roast a marshmallow.

Point to completed sequence and say: That’s how to go camping. Once computer has scrambled pictures, say: Now, you move the pictures to show me how to go camping. Show me the pictures the same way, in the same order that I showed you.
When participant appears finished, say, **Are you finished?** When child says YES or is obviously finished, click **NEXT**.

If child gives correct response: The program will move on to test sequence. Say: **That's right. You showed me how to go camping. You know how to play the game! Now we're done with practice.**

If child gives incorrect response, say: **Let's try that again. I am going to show you again how to go camping.** Click **PLAY**. The pictures will again appear and voice recordings will play. Then say: **That's how to go camping. I want you to put the pictures in the same order, in the same way that I just showed you. Now you try it again.**

Repeat Practice Sequence 2, following the steps above, until child responds correctly or sequence has been presented a total of four times. If the child does not succeed with Practice Sequence 2 in four or fewer trials, PSM testing is discontinued.

**Test Sequences:**

Participants ages 5-6 will be presented with two trials of a 9-step sequence.

Introduce the task by saying, **Now we are going to do the same thing with more pictures.** Now I am going to show you how to play in the park. Click **PLAY**; as the pictures are presented, a recorded voice will say the appropriate labels:

- Fly a kite.
- Play in the sand.
- Go down the slide.
- Pull the wagon.
- Draw on the sidewalk.
- Pet the dog.
- Feed the ducks.
- Push the swing.
- Smell a flower.

Point to completed sequence and say: **That's how to play in the park.** Once computer has scrambled pictures, say: **Now, you move the pictures to show me how to play in the park.** I want you to show them back to me in the same way, in the same order that I showed you.

When child appears finished, ask: **Are you finished?** When child says YES or is obviously finished, click **NEXT**. Introduce the repeated sequence with the following statement: **We're going to do the same pictures one more time. Everyone is asked to do this more than once.**
Once computer has scrambled pictures, say: **Now, you move the pictures to show me how to play in the park. I want you to show them back to me in the same way, in the same order that I showed you.**

When child appears finished, ask: **Are you finished?** When child says YES or is obviously finished, click **NEXT.**

*The test will terminate after two trials have been presented.*
Picture Sequence Memory (PSM) Instructions

Introduction and Training Sequence

There are three steps to this training sequence:

**Step 1:** Moving pictures from the yellow box to the gray boxes.

**Step 2:** Moving pictures from the gray boxes back to the yellow box.

**Step 3:** Moving pictures between the gray boxes.

The examiner should click PLAY to start the training sequence and each time it needs to be repeated. The examiner should click NEXT only when finished with the training sequence and he/she is ready to move to the actual test items.

**Step 1:** Moving pictures from the yellow box to gray boxes

When the first screen appears, say: **Now we are going to play a memory game, but first I am going to teach you how to move the pictures on this screen. Click PLAY.**

Say: Here you see some pictures in a yellow box (*picking flowers* pictures). I want to show you how to move the pictures to the gray boxes. You can move pictures from this yellow box (point) to the gray boxes down here (point), like this. **Click on the picture (click *cutting flowers*) in the yellow box; then click on the gray box you want to move it to (click first gray box). Now you try with this picture (point to second picture, *vase with flowers*).**

**Correct Response:** Say: **That’s right!**

**Incorrect Response:** Say: **Click on this picture** (point to picture in yellow box). When participant clicks on the picture, say: **Now click on this box** (point to empty gray box). When participant clicks gray box, say: **See; you moved the picture from here (point to yellow box) to here (point to current location of picture).**

Reset the pictures as they were before participant responded; click PLAY and say: **Now you try it again.**

Repeat demonstration and/or correction of moving pictures until participant understands concept of moving pictures from yellow to gray boxes, up to a total of four times. Then, continue with Step 2.
Step 2: Moving pictures from the gray boxes to the yellow box

Say: You can also move pictures from the gray boxes (point) back to the yellow box (point), like this (move ‘cutting flowers’ back to yellow box, pause). Now you move the other picture back to the yellow box (point to ‘vase with flowers’).

Correct Response: Say: That’s right!

Incorrect Response: Say: Click on this picture (point to ‘vase with flowers’). When participant clicks on picture, say: Now, click on the yellow box (point to yellow box). When participant clicks on yellow box, say: See; you moved the picture from here (point to original location) back to here (point to current location of picture). Move pictures back as they were before participant responded and say: Now you try it again.

Repeat demonstration and/or correction of moving pictures until participant understands concept of moving pictures from gray to yellow boxes, up to a total of four times. Then, continue with Step 3.

Step 3: Moving pictures between the gray boxes

Before beginning, the examiner should move ‘vase with flowers’ to first gray box. Then say: You can also move the pictures from one gray box to another, like this (click ‘vase with flowers’ and then click second gray box). First, you click on the picture in one gray box. Then, click on the gray box where you want the picture to go. Now you try it; move this picture from here (point to picture in second gray box) to here (point to first gray box).

Correct Response: Say: That’s right!

Incorrect Response: Reset picture as it was originally and say: Click on this picture (point to picture placed in second gray box). When participant clicks the picture, say: Now, click on this box (point to empty gray box). When participant clicks gray box, say: See, you moved the picture from this gray box (point to picture’s original location) to this one (point to picture’s current location). Reset pictures as they were before participant responded and say: Now you try it again.

Repeat demonstration and/or correction of moving pictures between gray boxes, up to a total of four times.

Practice sequences: There are two practice sequences. The child has four trials to complete each sequence. If child succeeds in four trials or less, the next practice sequence or test sequence is presented. If child fails all four trials of either practice sequence, PSM testing is discontinued.
As an introduction, say: **Now we are going to play the memory game. I will show you some pictures on the computer. I want you to remember them; then, I want you to show them back to me in the same way I showed you. Click NEXT.**

**Practice Sequence 1:**

**Say:** Now, I'm going to show you how to have a birthday party. **Click PLAY.** As pictures are presented, a recorded voice will say the appropriate labels:

- First, bake the cake.
- Next, frost it.
- And last, put on the candles.

Point to completed sequence and say: **That's how to have a birthday party.** Once computer has scrambled pictures, say: **Now, I want you to move the pictures to show me how to have a birthday party. I want you to show them back to me in the same way, in the same order that I showed you.**

When child appears finished, ask: **Are you finished?** When child says YES or is obviously finished, click **NEXT.**

If child gives correct response: Practice Sequence 2, Go Camping, will appear on the examiner's screen. **Say:** That's right. You showed me how to have a birthday party. Let's try another one.

If child gives incorrect response, say: **Let's try that again. I am going to show you again how to have a birthday party. Click PLAY.** The pictures will again appear and voice recordings will play. Then say: **That's how to have a birthday party. I want you to put the pictures the same way, in the same order that I just showed you. Now you try it again.**

Repeat Practice Sequence 1, following the steps above, until child responds correctly or sequence has been presented a total of four times. **If child does not succeed with Practice Sequence 1 in four or fewer trials, PSM testing is discontinued.**

**Practice Sequence 2:**

**Say:** Now, I'm going to show you how to go camping. **Click PLAY.** As pictures are presented, a recorded voice will say the appropriate labels:

- First, put up the tent.
- Then, go for a hike.
- Then, catch a fish.
- And last, roast a marshmallow.
Point to completed sequence and say: That's how to go camping. Once computer has scrambled pictures, say: Now, you move the pictures to show me how to go camping. Show me the pictures the same way, in the same order that I showed you.

When participant appears finished, say, Are you finished? When child says YES or is obviously finished, click NEXT.

If child gives correct response: The program will move on to test sequence. Say: That's right. You showed me how to go camping. You know how to play the game! Now we're done with practice.

If child gives incorrect response, say: Let's try that again. I am going to show you again how to go camping. Click PLAY. The pictures will again appear and voice recordings will play. Then say: That's how to go camping. I want you to put the pictures in the same order, in the same way that I just showed you. Now you try it again.

Repeat Practice Sequence 2, following the steps above, until child responds correctly or sequence has been presented a total of four times. If the child does not succeed with Practice Sequence 2 in four or fewer trials, PSM testing is discontinued.

Test Sequences:

Participants age 7 will be presented with one trial of a 15-step sequence and one trial of an 18-step sequence.

Introduce the task by saying: Now we are going to do the same thing with more pictures. Now I am going to show you how to play in the park. Click PLAY. As the pictures are presented, a recorded voice will say the appropriate labels:
<table>
<thead>
<tr>
<th>15-STEPS</th>
<th>18-STEPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fly a kite.</td>
<td>Fly a kite.</td>
</tr>
<tr>
<td>Play in the sand.</td>
<td>Play in the sand.</td>
</tr>
<tr>
<td>Go down the slide.</td>
<td>Go down the slide.</td>
</tr>
<tr>
<td>Pull the wagon.</td>
<td>Pull the wagon.</td>
</tr>
<tr>
<td>Swing on the monkey bars.</td>
<td>Swing on the monkey bars.</td>
</tr>
<tr>
<td>Lay out the blanket.</td>
<td>Lay out the blanket.</td>
</tr>
<tr>
<td>Play catch.</td>
<td>Play catch.</td>
</tr>
<tr>
<td>Catch a butterfly.</td>
<td>Catch a butterfly.</td>
</tr>
<tr>
<td>Kick the ball.</td>
<td>Kick the ball.</td>
</tr>
<tr>
<td>Take the baby for a walk.</td>
<td>Take the baby for a walk.</td>
</tr>
<tr>
<td>Draw on the sidewalk.</td>
<td>Draw on the sidewalk.</td>
</tr>
<tr>
<td>Pet the dog.</td>
<td>Pet the dog.</td>
</tr>
<tr>
<td>Feed the ducks.</td>
<td>Feed the ducks.</td>
</tr>
<tr>
<td>Push the swing.</td>
<td>Push the swing.</td>
</tr>
<tr>
<td>Smell a flower.</td>
<td>Smell a flower.</td>
</tr>
</tbody>
</table>

Point to completed sequence and say: **That's how to play in the park.** Once computer has scrambled the pictures, say: **Now, you to move the pictures to show me how to play in the park. I want you to show them back to me in the same way, in the same order that I showed you.**

When participant appears finished, ask: **Are you finished?** When participant says YES or is obviously finished, click NEXT.

Introduce next set of pictures; say: **Now we’re going to do the same pictures with some more pictures added. Everyone is asked to do this more than once. Click PLAY. Once computer has scrambled pictures, say: Now, you move the pictures to show me how to play in the park. I want you to show them back to me in the same way, in the same order that I showed you.**

When participant appears finished, ask: **Are you finished?** When participant says YES or is obviously finished, click NEXT.

**The test will terminate after two trials have been presented.**
Picture Sequence Memory (PSM) Instructions

Introduction and Training Sequence

There are three steps to this training sequence:

**Step 1:** Moving pictures from the yellow box to the gray boxes.

**Step 2:** Moving pictures from the gray boxes back to the yellow box.

**Step 3:** Moving pictures between the gray boxes.

The examiner should click **PLAY** to start the training sequence and each time it needs to be repeated. The examiner should click **NEXT** only when finished with the training sequence and he/she is ready to move to the actual test items.

**Step 1: Moving pictures from the yellow box to gray boxes**

When the first screen appears, say: **Now we are going to play a memory game, but first I am going to teach you how to move the pictures on this screen. Click **PLAY**.**

**Say:** Here you see some pictures in a yellow box (‘picking flowers’ pictures). I want to show you how to move the pictures to the gray boxes. You can move pictures from this yellow box (point) to the gray boxes down here (point), like this. Click on the picture (click ‘cutting flowers’) in the yellow box; then click on the gray box you want to move it to (click first gray box). Now you try with this picture (point to second picture, ‘vase with flowers’).

**Correct Response:** Say: **That’s right!**

**Incorrect Response:** Say: **Click on this picture** (point to picture in yellow box). When participant clicks on the picture, say: **Now click on this box** (point to empty gray box). When participant clicks on the gray box, say: **See; you moved the picture from here** (point to yellow box) **to here** (point to current location of picture).

Reset the pictures as they were before participant responded and say: **Now you try it again.**

Repeat demonstration and/or correction of moving pictures until the participant understands the concept of moving pictures from yellow to gray boxes, up to a total of four times. Then, continue with Step 2.
Step 2: Moving pictures from the gray boxes to the yellow box

Say: You can also move pictures from the gray boxes (point) back to the yellow box (point), like this (move ‘cutting flowers’ back to yellow box, pause). Now you move the other picture back to the yellow box (point to ‘vase with flowers’).

Correct Response: Say: That’s right!

Incorrect Response: Say: Click on this picture (point to ‘vase with flowers’). When participant clicks picture, say: Now, click on the yellow box (point to yellow box). When participant clicks yellow box, say: See; you moved the picture from here (point to original location) back to here (point to current location of picture). Move pictures back as they were before participant responded and say: Now you try it again.

Repeat demonstration and/or correction of moving pictures until participant understands the concept of moving pictures from gray to yellow boxes, up to a total of four times. Then, continue with Step 3.

Step 3: Moving pictures between the gray boxes

Before beginning, the examiner should move ‘vase with flowers’ to first gray box. Then say: You can also move the pictures from one gray box to another, like this (click ‘vase with flowers’ and then click second gray box). First, you click on the picture in one gray box. Then, click on the gray box where you want the picture to go. Now you try it; move this picture from here (point to picture in second gray box) to here (point to first gray box).

Correct Response: Say: That’s right!

Incorrect Response: Reset picture as it was originally and say: Click on this picture (point to picture placed in second gray box). When participant clicks picture, say: Now, click on this box (point to empty gray box). When participant clicks gray box, say: See, you moved the picture from this gray box (point to picture’s original location) to this one (point to picture’s current location). Reset pictures as they were before participant responded and say: Now you try it again.

Repeat demonstration and/or correction of moving pictures until participant understands the concept of moving pictures between gray boxes, up to a total of four times.

Practice Sequence: There is only one practice sequence. Participants have four trials to learn the task. If participant succeeds in four or fewer trials, the test sequences are presented. If participant does not succeed in four or fewer trials, PSM testing is discontinued.
As an introduction, say: **Now, we’re going to play the memory game. I will show you some pictures on the computer. I want you to remember them; then, I want you to show them back to me in the same way I showed you.**

Say: **Now, I’m going to show you how to go camping. Click PLAY.** As the pictures are presented, a voice recording will say the appropriate labels:

```
First, put up the tent.
Then, go for a hike.
Then, catch a fish.
And last, roast a marshmallow.
```

Point to completed sequence and say: **That’s how to go camping.** Once computer has scrambled the pictures, say: **Now, I want you to show me how to go camping. I want you to show them back to me in the same way, in the same order that I showed you.**

When participant appears finished, say: **Are you finished?** When participant says YES or is obviously finished, click **NEXT.**

If participant gives correct response: The program will move on to the test sequences. Say: **That’s right. You showed me how to go camping. You know how to play the game! Now we’re done with practice.**

If participant gives incorrect response, say: **Let’s try that again. I am going to show you again how to go camping. Click PLAY.** The pictures will again appear and the voice recordings will play. Then say: **That’s how to go camping. I want you to put the pictures in the same order, in the same way that I just showed you. Now you try it again.**

Repeat Practice Sequence, following the steps above, until participant responds correctly or sequence has been presented a total of four times. **If the participant does not succeed with the Practice Sequence after four trials, PSM testing is discontinued.**

**Test Sequences:**

Participants ages 8-85 will be presented with one trial of a 15-step sequence and one trial of an 18-step sequence.

Introduce the task by saying: **Now we are going to do the same thing with more pictures. Now I am going to show you how to play in the park. Click PLAY.** As the pictures are presented, a recorded voice will say the appropriate labels:
<table>
<thead>
<tr>
<th>15-STEPS</th>
<th>18-STEPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fly a kite.</td>
<td>Fly a kite.</td>
</tr>
<tr>
<td>Play in the sand.</td>
<td>Play in the sand.</td>
</tr>
<tr>
<td>Go down the slide.</td>
<td>Go down the slide.</td>
</tr>
<tr>
<td>Pull the wagon.</td>
<td>Pull the wagon.</td>
</tr>
<tr>
<td>Swing on the monkey bars.</td>
<td>Swing on the monkey bars.</td>
</tr>
<tr>
<td>Lay out the blanket.</td>
<td>Lay out the blanket.</td>
</tr>
<tr>
<td>Play catch.</td>
<td>Play catch.</td>
</tr>
<tr>
<td>Catch a butterfly.</td>
<td>Catch a butterfly.</td>
</tr>
<tr>
<td>Kick the ball.</td>
<td>Ride a bike.</td>
</tr>
<tr>
<td>Take the baby for a walk.</td>
<td>Row the boat.</td>
</tr>
<tr>
<td>Draw on the sidewalk.</td>
<td>Read a book.</td>
</tr>
<tr>
<td>Pet the dog.</td>
<td>Kick the ball.</td>
</tr>
<tr>
<td>Feed the ducks.</td>
<td>Take the baby for a walk.</td>
</tr>
<tr>
<td>Push the swing.</td>
<td>Draw on the sidewalk.</td>
</tr>
<tr>
<td>Smell a flower.</td>
<td>Pet the dog.</td>
</tr>
<tr>
<td></td>
<td>Feed the ducks.</td>
</tr>
<tr>
<td></td>
<td>Push the swing.</td>
</tr>
<tr>
<td></td>
<td>Smell a flower.</td>
</tr>
</tbody>
</table>

Point to completed sequence and say: **That's how to play in the park.** Once computer has scrambled the pictures, say: **Now, you move the pictures to show me how to play in the park. I want you to show them back to me in the same way, in the same order that I showed you.**

When participant appears finished, ask: **Are you finished?** When participant says YES or is obviously finished, click **NEXT**.

Introduce next set of pictures; say: **Now we're going to do the same pictures with some more pictures added. Everyone is asked to do this more than once. Click PLAY. Once computer has scrambled pictures, say: Now, you move the pictures to show me how to play in the park. I want you to show them back to me in the same way, in the same order that I showed you.**

When participant appears finished, ask: **Are you finished?** When participant says YES or is obviously finished, click **NEXT**.

*The test will terminate after two trials have been presented.*
Oral Reading Recognition

Materials:
Laptop & mouse
Monitor

Description:
The participant is asked to read and pronounce letters and words as accurately as possible. For the youngest children, the initial items require them to identify the letters in an array with three symbols or to identify a specific letter in an array of four letters. In both English and Spanish, the administration is individualized using a computerized adaptive format.

In English, one set of instructions is used for all participants; in Spanish, the instructions differ for children (ages 3-17 years) and adults (ages 18-85 years).

Overview:
Each participant will see a series of letters and words presented one at a time on the computer screen. Items are presented in order of difficulty – the computer adjusts the difficulty level of items depending on the participant’s performance. The number of items presented will depend on age, but will be between approximately 25 for most participants. The computer will administer each item one by one, in an untimed fashion, until the test is completed.

Scoring:
The test is scored automatically by the computer, but the examiner must record whether each response is correct. As the participant pronounces a letter or word, the examiner checks the pronunciation key on the screen and clicks the Yes button if the pronunciation is correct or the No button if the response is incorrect. Testing is automatically discontinued if a participant makes seven consecutive errors.

Note: It is essential that the examiner thoroughly review and master the item pronunciation guide before administering this test and adhere to it for all item scoring. The examiner should not rely on his or her understanding of word pronunciations based on previous experience. At the same time, while scoring is strict, it should take into consideration difficulties in pronunciation that can be attributed to dialect or articulation; to the extent that these difficulties are consistent throughout the testing, they should be accepted as correct pronunciations by the examiner.
Oral Reading Instructions

Say: Now I’m going to show you some letters and some words. I want you to read each letter or word out loud. Read each one loud enough so that I can hear you. Some will be easy and some will be hard. Don’t worry if you don’t know the word or its meaning – just read it out loud the best you can. Let’s begin. Click START TEST.

When the first item appears, say: Tell me, what is this letter/word? (Say whichever is appropriate. This prompt can be repeated as many times as needed.)

For children ages 3-4, the first item(s) will require the participant to point to a letter rather than name it. Follow the on-screen instructions. Note: One or more of these items may be administered to older participants, depending on their performance on the test and what the computer selects to display for a given participant.

If the participant says: I don’t know this one or I can’t read it, say: It is OK if you don’t know the word or what it means – just try to read it as best you can. This prompt can be used to reassure participants if they refuse to read the letters/words. If, after prompting, a participant refuses to offer a response, mark the item incorrect (No) and the computer will move on to the next item.

Once the examiner scores an item (selects Yes or No), he or she should select the NEXT button to move on to the next item.

NOTE: The examiner can change one previous item after selecting the NEXT button, by clicking the Go Back button.

The English word list and pronunciation guide are available by request at help@assessmentcenter.net.
Auditory Verbal Learning (Rey) Test

Materials:
Laptop & Mouse
Speakers

Description:
The NIH Toolbox Auditory Verbal Learning Test (AVLT) is an adaptation of the RVALT, a brief and easily-administered measure of immediate memory and verbal learning. It consists of a list of 15 unrelated words (see below) that are read by the computer to the participant at a rate of one word per second. For Toolbox, the list is repeated three times. All instructions read by the examiner are on the computer screen.

<table>
<thead>
<tr>
<th>English List</th>
<th>Spanish List</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drum</td>
<td>Tambor</td>
</tr>
<tr>
<td>Curtain</td>
<td>Cortina</td>
</tr>
<tr>
<td>Bell</td>
<td>Campana</td>
</tr>
<tr>
<td>Coffee</td>
<td>Café</td>
</tr>
<tr>
<td>School</td>
<td>Escuela</td>
</tr>
<tr>
<td>Parent</td>
<td>Padres</td>
</tr>
<tr>
<td>Moon</td>
<td>Luna</td>
</tr>
<tr>
<td>Garden</td>
<td>Jardín</td>
</tr>
<tr>
<td>Hat</td>
<td>Sombrero</td>
</tr>
<tr>
<td>Farmer</td>
<td>Ranchero</td>
</tr>
<tr>
<td>Nose</td>
<td>Nariz</td>
</tr>
<tr>
<td>Turkey</td>
<td>Guajolote</td>
</tr>
<tr>
<td>Color</td>
<td>Color</td>
</tr>
<tr>
<td>House</td>
<td>Casa</td>
</tr>
<tr>
<td>River</td>
<td>Rio</td>
</tr>
</tbody>
</table>
Auditory Verbal Learning (Rey) Instructions

**Trial 1:** The examiner reads from the screen: Now we are going to do some memory for words. The computer will read a list of words. Listen carefully; when the voice stops, you are to repeat back as many words as you can remember. It does not matter in what order you repeat them. Just try to remember as many words as you can. Ready?

The examiner should click on the **PLAY** button on the examiner’s screen and the computer will read the list of words.

As soon as the participant starts repeating words, the examiner should record each word the participant says by clicking on the box next to the word on the worksheet on the examiner’s screen. This record keeping requires the examiner to work fast and keep pace with the participant. If the participant says a word that is not on the list, the examiner should ignore it.

After the participant finishes naming words from the first trial, the examiner should click on the **NEXT** button and administer the list two more times with the following instructions:

**Trial 2:** The examiner reads: Once again, the computer will read the same words, and again when the voice stops, I want you to tell me as many words as you can remember whether or not you said them before. Ready?

The examiner should click on the **PLAY** button on the examiner’s screen and the computer will read the list of words.

As soon as the participant starts repeating words, the examiner should record each word the participant says by clicking on the box next to the word on the worksheet on the examiner’s screen. If the participant says a word that is not on the list, the examiner should ignore it.

After the participant finishes naming words from the second trial, the examiner should click the **NEXT** button and administer the list one more time with the following instructions:

**Trial 3:** The examiner reads: Again, the computer will read the same words, and once again when the voice stops, I want you to tell me as many words as you can remember whether or not you said them before. Ready?

The examiner should click on the **PLAY** button on the examiner’s screen and the computer will read the list of words.

As soon as the participant starts repeating words, the examiner should record each word the participant says by clicking on the box next to the word on the worksheet on the examiner’s screen. If the participant says a word that is not on the list, the examiner should ignore it.

The test ends automatically after three trials.
Oral Symbol Digit

Materials:
Laptop and mouse
Monitor

Description:
In this measure of processing speed, the participant will be given 120 seconds to orally match symbols with digits as quickly as possible. The key (specifying which symbols are assigned to which numbers) will be located at the top of a computer screen that shows the page. The examiner should record the participant’s responses directly on the computer screen. If the examiner uses a separate answer sheet, the examiner must enter the participant’s responses into the computer before the next test is administered.

Practice items:
The examiner points to the computer screen and says: Please look at the symbols at the top of the screen. Each symbol is paired with a number (the examiner points to the pairs and shows how they are arranged across the row).

The examiner continues: Now look here (the examiner points to the row of symbols without numbers). Here, there are symbols but no numbers. I would like you to tell me the number that goes with each symbol like this: You see this symbol (e.g., O), it is matched with the number 6 (the examiner points to the key), so you would say or tell me 6; this next symbol (the examiner points to the X), is paired with an 8 (point), so you would say or tell me 8. Does this make sense? Now you try the rest of the row for practice. Remember to say each number out loud so that I can hear you.

The examiner should provide feedback after each response, indicating whether the response is correct with That’s right or correcting the response when it is wrong.

After the participant has completed the practice row, say: Good. Now that you know how to do this, I am going to ask you to do some more.

Test items:
The examiner should point to the computer screen and say: When I tell you to begin I want you to do the rows on the next screen the same way. I want you to work as quickly as you can without skipping any of the boxes or making mistakes. When you are finished with the first row (the examiner points), move on to the next one (the examiner points). Continue until the screen goes blank. If you make a mistake, just tell me the correct answer and keep going. Ready? The examiner should click the START TEST button as he/she says: Begin.
The examiner should click the boxes below the items the participant answers correctly.
The participant screen will turn off after two minutes.
The examiner should say to the participant: **We’re now finished with that activity.**
Screens for participants and examiners are given below:

---

**Participant practice screen:**

**Participant test screen:**

**Examiner practice screen:**
Examiner test screens:
Oral Symbol Digit Instructions

Administration instructions are on the examiner screen.

Practice items:
The examiner points to the computer screen and says: Please look at the symbols at the top of the screen. Each symbol is paired with a number (the examiner points to the pairs and shows how they are arranged across the row).

The examiner continues: Now look here (the examiner points to the row of symbols without numbers). Here, there are symbols but no numbers. I would like you to tell me the number that goes with each symbol like this: You see this symbol (e.g., O), it is matched with the number 6 (the examiner points to the key), so you would say or tell me 6; this next symbol (the examiner points to the X), is paired with an 8 (point), so you would say or tell me 8. Does this make sense? Now you try the rest of the row for practice. Remember to say each number out loud so that I can hear you.

The examiner should provide feedback after each response, indicating whether the response is correct with That’s right or correcting the response when it is wrong.

After the participant has completed the practice row, say: Good. Now that you know how to do this, I am going to ask you to do some more.

Test items:
The examiner should point to the computer screen and say: When I tell you to begin I want you to do the rows on the next screen the same way. I want you to work as quickly as you can without skipping any of the boxes or making mistakes. When you are finished with the first row (the examiner points), move on to the next one (the examiner points). Continue until the screen goes blank. If you make a mistake, just tell me the correct answer and keep going. Ready?

The examiner should click the START TEST button as he/she says: Begin.

The examiner should click on the boxes below the items the participant answers correctly.

The participant screen will turn off after two minutes.

The examiner says to the participant: We’re now finished with that activity.
9-Hole Pegboard Dexterity

**Materials:**
Laptop
9-hole Pegboard

**Description:**
This measure assesses fine motor dexterity. **Data is recorded using an on-screen timer.** The data may also be recorded on a motor data sheet.

**Set-up:**
Place the pegboard on the table, positioning it in front and at the center of the participant’s body. Place the cup with the 9 pegs on the side of the hand being tested. The hand not being tested can be used to stabilize the board. The hand being tested **should be flat** on the table (palm down) until the administrator says **Go** in English or **¡Ya!** in Spanish.

**Set up**
9-Hole Pegboard Instructions

Say: In this activity we are going to see how fast you work with your hands. If handedness was not determined earlier, use the established protocol to do so. If examiner already knows participant’s handedness, say: You usually use this hand, right? (point to dominant hand and say your right or left, as appropriate).

Dominant Hand Practice:
Show participant the pegboard and say: This is a pegboard and these are the pegs. All the pegs are the same. Pick up the pegs one at a time using this (point to dominant hand and say your right or left, as appropriate) hand only. Put them in the holes one at a time until all 9 holes are filled. Then take them all out, one at a time, like this. (Examiner demonstrates task.) The pegs can be put in the holes or taken out in any order. I have extra pegs, so if you drop a peg, don’t go after it. I’ll put in another one.

Have participant start with his/her hand flat on table beside pegboard. Have participant do a practice trial with his/her dominant hand. Remind participant that non-dominant hand can be used to stabilize board and continue: Let’s practice with this (point to dominant hand and say your right or left, as appropriate) hand. You can use your other hand to hold the board in place. Are you ready? 3, 2, 1, Go! Start timer on computer screen when you say go; move cursor to stop button and stop timer when participant places final peg in cup.

Test Trial (dominant hand):
Say: Now I will time how fast you can do this. Pick up the pegs one at a time using only this (point to dominant hand and say your right or left, as appropriate) hand. Put them in the holes, one at a time, until all 9 holes are filled. Then take them all out, one at a time. The pegs can be put in the holes or taken out in any order. Remember to work as fast as you can. Are you ready? 3, 2, 1 Go! As participant is placing final peg, say: And take them out. Start timer on computer screen when you say go; move cursor to stop button and stop timer when participant places final peg in cup.

Non-Dominant Hand Practice:
Turn pegboard around so that cup with the pegs is on the side of non-dominant hand and say: Now we are going to do the same thing with your other hand. Again, pick up the pegs one at a time using only this (point to non-dominant hand and say your right or left, as appropriate) hand. Put them in the holes, one at a time, until all 9 holes are filled. Then take them all out, one at a time. The pegs can be put in the holes or taken out in any order.
Have participant do a practice trial with his/her non-dominant hand. Have participant start with his/her hand flat on table beside pegboard. Remind participant that his/her dominant hand can be used to stabilize board.

Continue: Let’s practice. Remember, you can use your other hand to hold the board in place. Are you ready? 3, 2, 1, Go! Start timer on computer screen when you say go; move cursor to stop button and stop timer when participant places final peg in cup.

Test Trial (non-dominant hand):
Say: Now I will time how fast you can do this. Pick up the pegs one at a time using your (point to non-dominant hand and say your right or left, as appropriate) hand only. Put them in the holes, one at a time, until all 9 holes are filled. Then take them all out, one at a time. The pegs can be put in the holes or taken out in any order. Remember to go as fast as you can. Are you ready? 3, 2, 1 Go! As participant is placing final peg, say: And take them out. Start timer on computer screen when you say go; move cursor to stop button and stop timer when participant places final peg in cup.
Grip Strength

Materials:
Laptop
Dynamometer

Description:
This is a measure of upper extremity strength.

Set-up:
Turn on the dynamometer and press TEST. For all participants, set the dynamometer on the 2nd notch. RESET the dynamometer between each trial.

Have the participant sit down in the chair so his/her feet are on the floor or foot plate of the wheelchair and his/her knees are at a 90-degree angle. Position the arm being tested at a 90-degree angle, next to but not touching the participant’s body.
During testing, the examiner should support the dynamometer as shown below:
Grip Strength Instructions

Show dynamometer; say: We will use this machine to measure how strong your hands are. You will squeeze the handle 2 times (one practice and one test trial) with each hand while your arm is against your side and your elbow is bent like this (90 degrees). The handle won't move, but the machine will show how hard you squeezed. See? Show participant the force measurement. Do you have any questions?

Practice (dominant hand):

Say: Let’s practice; first we’ll use this (point to dominant hand; say your right or left as appropriate) hand. When I say ‘squeeze’, I want you to squeeze the handle hard but not as hard as you can. Support dynamometer during testing as shown earlier. Continue: Ready? 3-2-1-squeeze. After 3-4 seconds, say: Stop. Press RESET and TEST on dynamometer before next trial.

Practice (non-dominant hand):

Continue: Now we’ll practice with your other hand (put dynamometer in non-dominant hand; say your right or left as appropriate). When I say ‘squeeze’, I want you to squeeze the handle hard but not as hard as you can. Support dynamometer during testing as shown earlier. Continue: Ready? 3-2-1-squeeze. After 3-4 seconds, say: Stop. Press RESET and TEST on dynamometer before next trial.

Test Trial (dominant hand):

Say: Now we’re going to test each hand, beginning with this (point to dominant hand; say your right or left as appropriate) hand. When I say ‘squeeze’, this time I want you to squeeze the handle as hard as you can. Support dynamometer during testing. Continue: Ready? 3-2-1-squeeze! Harder, harder, harder. After 3-4 seconds, say: Stop.

Record force to nearest tenth of a pound on the computer screen. Press RESET and TEST on dynamometer before next trial.

Test Trial (non-dominant):

Say: OK, now we’re going to test your other (point to non-dominant hand; say your right or left as appropriate) hand. When I say ‘squeeze’, this time I want you to squeeze the handle as hard as you can. Support dynamometer during testing. Continue: Ready? 3-2-1-squeeze! Harder, harder, harder. After 3-4 seconds, say: Stop.

Record force to nearest tenth of a pound on the computer screen. Turn off dynamometer when testing is completed.
Standing Balance

Materials:
Laptop computer and mouse
Paper from adhesive flip chart (2’ x 3’) hung on wall with large X for adult participants or an attractive picture for child participants; paper should be placed one meter from the tip of the participant’s big toe and at participant’s eye level.
Accelerometer unit – gait belt and sensor
Blue Airex Balance Pad Elite (foam pad)

Description:
This task is designed to assess postural sway and to determine participants’ vestibulo-spinal function. Children, ages 3-6, are asked to complete the first four poses; participants, ages 7-85 years, should complete all five poses. In English, one set of instructions is used for participants of all ages; in Spanish, two sets are used: one for participants ages 3-17 and another for participants ages 18-85 years.

Exclusion rules to participants who are not tested by a trained professional. These are:
- Weight over 250 pounds
- Diabetes, depending on comfort
- Joint replacement(s), depending on comfort
- Previous stroke
- Parkinson’s disease
- Dizziness/vertigo
- Fallen in the last 6 months more than one time not as a result of an accident
- Multiple sclerosis
- Macular degeneration
- Glaucoma
- Cataracts
- Pregnancy

Set-up:
This task requires the examiner to set up the equipment before the participant arrives. Go to the step-by-step instructions in the section entitled Bluetooth Setup in the Introduction to Computer and Special Equipment. Then proceed with the instructions below:
Wireless Accelerometer

- A participant’s movement (sway) is measured by a wireless (Bluetooth) accelerometer, contained inside a small plastic box. The accelerometer unit simply attaches by Velcro to the gait belt, as shown below. It is critical that the accelerometer be attached in the correct orientation as shown (not upside-down).

- The accelerometer has a power switch on the front. Slide it to the left to turn on the unit. Two small lights on the front provide different information: The red light will come on and remain solid once the unit is turned on. It will blink if the battery is low. The blue light will come on when there is wireless communication occurring between the device and the computer.

- On the front of the accelerometer is a slot where the A/C charger cord should be connected. The accelerometer should be recharged each night before the next day’s use. When the charger’s green light turns on, the unit is fully charged.

Troubleshooting the Wireless Communication:

Bluetooth is a wireless communication method, and as such, occasionally, though unlikely, the signal may be “lost,” meaning that the accelerometer is no longer communicating with the computer. To check if there is a communication problem: 1) identify whether the blue light on the accelerometer unit has gone off (or does not turn on); 2) determine if an error message, “Device is not connected,” has appeared on the examiner screen. If this communication error occurs, follow these steps:

1. Turn off the accelerometer (leave the computer as is).
2. Wait 10 seconds.
3. Turn on the accelerometer and wait another 10 seconds.
4. Click Start again on the computer when the participant is ready to start the trial.
**Note:** If, for any reason, the accelerometer unit must be replaced and another is substituted with a given computer, the accelerometer and the computer’s Bluetooth receiver must be paired so that they can communicate. These instructions are provided in the Bluetooth Setup for the NIH Standing Balance Test subsection found in the manual section entitled: Introduction to the Computer and Special Equipment.

Starting the Test/Program Operation:

1. On the computer, click **Start Test**.

2. The initial data collection screen will appear, as shown below. A similar screen will appear for each trial of each position, as appropriate based on the age of the participant and his/her performance on the task.

![Initial data collection screen for Pose 1, Trial 1](image)

3. To start a trial (once the participant is ready – see detailed instructions below for each pose), click the **Start** button. When the tone sounds, say, **Go**. The blue light on the accelerometer will be illuminated and the timer at the top of the screen will count down from 50 (which the examiner can easily see while maintaining the safety of the participant). A message at the bottom of the screen will say **collecting data**.

4. When the 50 seconds has elapsed, a tone will sound. If the participant was able to hold the position for the duration, click **Yes**; if not, click **No**. If the participant was not able to hold the position well before the time has elapsed, the examiner should first ensure the participant is stable (using the gait belt handles in case of a potential fall), and should then click **Stop** and **No**. After choosing yes or no, click **Next**. Note any observations if the participant was unsuccessful.

5. Either a second trial of the same position or the next position for the participant will appear on the examiner screen. Follow the same procedures outlined in 3 and 4 above.

**Note:** Check the accelerometer to ensure that the blue light has turned OFF before clicking **START**.
Preparing the Participant:

Strap the Velcro gait belt onto the participant so that the belt is fit tightly around the pelvis. The handles of the belt should be positioned behind the participant and may be used by the examiner in case of loss of balance by the participant. If the participant has a smaller waist, it may be necessary to wrap the belt a second time around the participant. If so, be sure the accelerometer is still positioned appropriately.

For children ages 3-6, the accelerometer is worn on the back of the belt; the handles of the gait belt should be positioned on whichever side of the child is closest to where the examiner will be positioned.

For participants ages 7-85, the accelerometer unit is to be attached on the front of the belt (approximately where a typical belt buckle would be located). The handles should be to the back of the participant.

Participants are to stand in their bare/stocking feet (no shoes). Place a chair placed behind the participant if rest is needed between trials. The examiner should stand behind the participant (to the side of participants ages 3-12) to be ready to prevent the participant from falling. During testing, the laptop computer should be placed on a table in close proximity to the examiner. It is crucial that the laptop is never greater than 25' away from the accelerometer system (i.e., the belt unit the participant is wearing) during testing.

Each participant will be given up to two trials to be successful. Use the following guidelines to stop a trial as any of these are evidence that the participant is no longer holding the pose:

1. If the arms come off the chest
2. If the knees bend
3. If the feet move out of original position (move or swivel out or are lifted)
4. If the participant bends forward at the waist (more than 45 degrees). If this happens, the examiner will have to support the participant with the belt
5. If the participant says something like: “I cannot do that” or “I do not feel safe trying that”

Throughout testing, remind the participant that he/she can step out of the pose, if he/she is feeling unsafe or unable to hold the pose.

A second trial should be attempted if the first trial is not successfully completed; the examiner should stand close to the participant to prevent actual falls. Some participants will succeed on the second trial, even if they failed the first trial (particularly on the foam or in the tandem pose).
The task order is always the same:

- Pose 1: flat surface, feet together, eyes open;
- Pose 2: flat surface, feet together, eyes closed;
- Pose 3: on foam, feet together, eyes open;
- Pose 4: on foam, feet together, eyes closed;
- Pose 5: flat surface, tandem stance, eyes open.

**Note:** The tandem stance position is only given to participants ages 7 and above.

Throughout the task, the computer may invoke Discontinue Rules automatically. These are:

**Rule 1:** If the participant cannot successfully complete either trial of pose 1, the test will be discontinued.

**Rule 2:** If the participant cannot successfully complete either trial of pose 2, he/she will not be asked to perform any more poses with eyes closed (i.e., will not be administered poses 4).

**Rule 3:** If the participant cannot successfully complete either trial of pose 3, the test will skip ahead to pose 5.
Standing Balance Instructions

Participants are to stand in their bare/stocking feet (no shoes). While putting the belt and accelerometer on the participant, say: This is a test of your balance. There are as many as 5 (or, for participants ages 3-6, 4) different poses that you will be asked to do. During each pose, you will be asked to stand as steady as possible for 50 seconds. You will have a second chance if you cannot hold the position for 50 seconds. Between each set of poses, you may rest in the chair if needed. Please try to do your best. I will demonstrate how I want you to stand before each pose.

Explain that the accelerometer on the belt is used to measure balance and ask permission to put on the belt or ask the participant to help. The belt should fit tightly around the pelvis and the handles of the belt should be positioned to the back of the participant. For ages 7 and older, the accelerometer is placed on the front of the belt. For ages 3-6, the accelerometer should be placed on the back of the belt (and the handles on the belt should be on the participant’s side).

The examiner should proceed through each of the poses with the participant until the test is completed. After each trial or pose is completed, the examiner should ask: Are you ready for the next one?

If the participant says NO or otherwise indicates that he/she needs to rest, say: Please sit in this chair to rest. The examiner should note the time the participant begins resting; a maximum of one minute of rest is permitted.

Every 15 seconds or so, the examiner should ask: Are you ready to continue? If the participant indicates that he/she is ready, proceed with the next trial or pose. If the participant is not ready, wait and ask again in another 15 seconds.

If the participant is not ready by the end of the one-minute rest period, the test is discontinued. In such a case, the examiner should say: Let’s go on to another activity.

Throughout the testing, the examiner should remind the participant that he/she can step out of the pose if he/she is feeling unsafe or unable to hold the pose.
Pose 1: Flat surface, feet together, eyes open

The examiner should demonstrate the pose and then ask the participant to stand in the desired position, saying: Please stand with your feet together (heels & balls of feet touching) and as still as possible with your eyes open and with your arms crossed on your chest, like this (demonstrate for participant). Focus on the X (or picture) shown on the wall in front of you. Ready? The examiner clicks the START button, waits for the tone, and immediately says: Go.

The examiner should immediately click the START button and check the participant’s posture. The computer screen will display the elapsed time of the trial so the examiner can easily see it while assuring the safety of the participant. After 50 seconds, the program will show a window. Choose YES if the participant was able to maintain balance for the full 50 seconds. Choose NO if the participant did not successfully complete the trial for any reason.

If the participant did not successfully complete the trial, the computer will then display trial 2 of this pose, and the examiner should say: Let’s try that one again. Please stand with your feet together (heels & balls of feet touching) and as still as possible with your eyes open and with your arms crossed on your chest, like this (demonstrate for participant). Focus on the X (or picture) shown on the wall in front of you. Ready? The examiner clicks the START button, waits for the tone, and immediately says: Go.

Once the participant successfully completes a trial, say: Are you ready for the next one? Proceed with the next pose or allow the participant to rest, following the procedures noted earlier. If participant fails trial 2, the discontinue rule is invoked; say: We are done with this activity.
Pose 2: Flat surface, feet together, eyes closed

Pose 2 is the same as Pose 1, except this time the participant’s eyes are closed. The examiner should demonstrate the pose and then ask the participant to stand in the desired position, saying: Please stand with your feet together (heels & balls of feet touching) and as still as possible with your eyes closed and with your arms crossed on your chest, like this (demonstrate for participant). Ready? The examiner clicks the START button, waits for the tone, and immediately says: Go.

The examiner should immediately click the START button and check the participant’s posture. The computer screen will display the elapsed time of the trial so the examiner can easily see it while assuring the safety of the participant. After 50 seconds, the program will show a window. Choose YES if the participant was able to maintain balance for the full 50 seconds. Choose NO if the participant did not successfully complete the trial for any reason.

If the participant did not successfully complete the trial, the computer will then display trial 2 of this pose, and the examiner should say: Let’s try that one again. Please stand with your feet together (heels & balls of feet touching) and as still as possible with your eyes closed and with your arms crossed on your chest, like this (demonstrate for participant). Ready? The examiner clicks the START button, waits for the tone, and immediately says: Go.

After participant completes one or both trials, say: Are you ready for the next one? Proceed with the next pose or allow the participant to rest, following the procedures noted earlier.

Pose 3: Foam surface, feet together, eyes open
The examiner should pick up the blue pad and place it on the floor one meter in front of the X (or picture) on the wall. The examiner should demonstrate the pose and then ask the participant to stand in the desired position, saying: **Please step onto the foam and put your feet together (heels & balls of feet touching) and stand as still as possible with your eyes open and your arms crossed on your chest, like this** (demonstrate for participant). Focus on the X (or picture) shown on the wall in front of you. Ready? The examiner clicks the **START** button, waits for the tone, and immediately says: **Go**.

The examiner should immediately click the **START** button and check the participant’s posture. The computer screen will display the elapsed time of the trial so the examiner can easily see it while assuring the safety of the participant. After 50 seconds, the program will show a window. Choose **YES** if the participant was able to maintain balance for the full 50 seconds. Choose **NO** if the participant did not successfully complete the trial for any reason.

If the participant did not successfully complete the trial, the computer will then display trial 2 of this pose, and the examiner should say: **Let’s try that one again. Please step onto the foam and put your feet together (heels & balls of feet touching) and stand as still as possible with your eyes open and your arms crossed on your chest, like this** (demonstrate for participant). Focus on the X (or picture) shown on the wall in front of you. Ready? The examiner clicks the **START** button, waits for the tone, and immediately says: **Go**.

Once the participant successfully completes a trial, say: **Are you ready for the next one?** Proceed with the next pose or allow the participant to rest, following the procedures noted earlier. If participant fails trial 2, the discontinue rule is invoked; say: **We are done with this activity.**

**Pose 4: Foam surface, feet together, eyes closed**

Pose 4 is the same as Pose 3 except that the participant’s eyes are closed.

The examiner should demonstrate the pose and then ask the participant to stand in the desired position, saying: **Please step onto the foam and put your feet together (heels & balls of feet touching) and stand as still as possible with your arms crossed on your chest, and then close your eyes, like this** (demonstrate for participant). Ready? The examiner clicks the **START** button, waits for the tone, and immediately says: **Go**.

The examiner should immediately click the **START** button and check the participant’s posture. The computer screen will display the elapsed time of the trial so the examiner can easily see it while assuring the safety of the participant. After 50 seconds, the program will show a window. Choose **YES** if the participant was able to maintain balance for the full 50 seconds. Choose **NO** if the participant did not successfully complete the trial for any reason.
If the participant did not successfully complete the trial, the computer will then display trial 2 of this pose, and the examiner should say: Let’s try that one again. Please step onto the foam and put your feet together (heels & balls of feet touching) and stand as still as possible with your arms crossed on your chest, and then close your eyes, like this (demonstrate for participant). Ready? The examiner clicks the START button, waits for the tone, and immediately says: Go.

After participant completes one or both trials, say: Are you ready for the next one? Proceed with the next pose or allow the participant to rest, following the procedures noted earlier.

Pose 5: Flat surface, tandem stance, eyes open (ages 7 and older)

The examiner should demonstrate the pose and then ask the participant to stand in the desired position, saying: Please stand with the heel of one foot touching the toes of the other foot on the ground. Keep them in a straight line. Stand as still as possible with your eyes open and with your arms crossed on your chest, like this (demonstrate for participant). Before you do this, try each foot in front and decide for yourself which one is more comfortable. Then, focus on the X (or picture) shown on the wall in front of you. Ready? The examiner clicks the START button, waits for the tone, and immediately says: Go.

The examiner should immediately click the START button and check the participant’s posture. The computer screen will display the elapsed time of the trial so the examiner can easily see it while assuring the safety of the participant. After 50 seconds, the program will show a window. Choose YES if the participant was able to maintain balance for the full 50 seconds. Choose NO if the participant did not successfully complete the trial for any reason.
If the participant did not successfully complete the trial, the computer will then display trial 2 of this pose, and the examiner should say: Let’s try that one again. Please stand with the heel of one foot touching the toes of the other foot on the ground. Keep them in a straight line. Stand as still as possible with your eyes open and with your arms crossed on your chest, like this (demonstrate for participant). Focus on the X (or picture) shown on the wall in front of you. Ready? The examiner clicks the START button, waits for the tone, and immediately says: Go.

When the participant has completed pose 5, say: We are done with this activity.
4-Meter Walk Gait Speed

Materials:
Laptop
Stopwatch
Measuring tape with meters/feet
Two cones
Marker tape
Clipboard and Data sheet

Description:
This measure of gait speed is administered in an open hallway using the same path as the 2-minute walk. It is administered two times, both at normal pace. A practice trial precedes the timed trials. In English, one set of instructions is used for all ages; in Spanish, two sets of instructions are used: one for participants 7-17 years and another for participants 18-85 years. This measure should not be done in bare feet, high heeled or open back shoes, sandals, or flip flops.

Set-up:
Before the participant arrives and using the path marked out for the 2-minute walk, put a piece of marker tape perpendicular to the course at a line 1.0 meter past the 4-meter line. Place a cone at the start line and at the line 5.0 meters from the start line. See the diagram below:
4-Meter Walk Gait Speed Instructions

The examiner should observe how participants walk normally. If they use a cane or other walking device and feel they need it for the walking test, they may use it. If the participant uses such a device, the examiner should note its use on the Data Form.

Practice Trial: The examiner should show the participant the walking course and say: This activity involves walking from one place to another. This is our walking course (point to the course). I want you to walk to the other end of the course at your usual speed, just as if you were walking down the street to go to the store.

The examiner explains the walk: Let me show you what I want you to do. Put both your feet together behind this line. Walk all the way past the cone on the other end before you stop. Before the demonstration, say: 3, 2, 1, Go!

After examiner returns, have the participant stand with both feet touching the start line and say: When I want you to start, I will say: 3, 2, 1, go. Do you have any questions?

Say: Now you try. Remember to walk at your usual speed and keep walking until you pass the cone. Ready? 3, 2, 1, Go!

When the participant passes the cone, say: That's good. Do you have any questions? (Answer any questions the participant may ask.)

Trial 1: Say: This time, I am going to time you as you walk at your usual speed. Are you ready? 3, 2, 1, Go!

Begin timing (press start/stop button) when the participant steps over (first footfall) the starting line. Walk behind and to the side of the participant as he/she walks. Stop timing when one of the participant’s feet is completely across the end/finish line (the line at 4.0 meters – not the line at 5.0 meters). If the participant stumbles or tries to run, void that trial and ask the participant to do another trial. Record the data on the record form and later transfer to the computer data entry forms.

Trial 2: Say: Now I want you to repeat the walk. Remember to walk at your usual pace and go all the way past the other end of the course. I am going to time you as you walk at your usual speed. Are you ready? 3, 2, 1, Go!

Begin timing (press start/stop button) when the participant steps over (first footfall) the starting line. Walk behind and to the side of the participant as he/she walks. Stop timing when one of the participant’s feet is completely across the end/finish line (the line at 4.0 meters – not the line at 5.0 meters). If the participant stumbles or tries to run, void that trial and ask the participant to do another trial. Record the data on the record form and later transfer to the computer data entry forms.

If needed, have the participant rest on a chair for at least one minute before the next task.
2-Minute Walk Endurance

Materials:
Laptop
Stopwatch
Measuring tape with meters/feet
Two cones
Marker tape
Clipboard and Data sheet
Chair

Description:
This measure of endurance is administered in an open hallway. In English, one set of instructions is used for all ages; in Spanish, two sets of instructions are used: one for participants ages 3-17 and another for participants ages 18-85. The participant should be wearing comfortable shoes such as athletic shoes. This measure should not be done in bare feet, high heeled or open back shoes, sandals, or flip flops.

Set-up:
Before participants arrive, the examiner should use tape to mark a 50-foot course with 10-foot intervals in a wide, flat, open area such as a hallway. The examiner should allow a minimum of 5 feet on each end of the course so that a participant has room to turn around the cone. Place a cone at either end of the course. Place a chair near the beginning of the course in case a participant becomes fatigued and needs to rest.

See the diagram below:
2-Minute Walk Endurance Instructions

Examiner should have participant sit in chair near the beginning of the walking course. Introduce the task; say: This is an activity that shows how physically fit you are by seeing how far you can walk in 2 minutes. I will ask you to walk as fast as you can until I ask you to stop. I know this is hard for some people so don’t worry if you have to slow down or rest. If you do stop or slow down, start walking again as soon as you feel you are ready to do so.

Ask: Is there any reason you cannot do the walk? Does anything hurt or are you in pain? What I would like here is to have you walk as far as you can in this short period of time. If participant does not feel he or she can do this task, note this on the record sheet and continue with another measure.

Continue: You and I will not talk while you are walking because this might make you walk more slowly. I will, however, let you know how much time you have to walk and when you are almost done.

While demonstrating first part of the task, say: Let me show you what you are going to do. You will start with your feet behind this line. When I say ‘Go,’ you will walk back and forth around the cones as fast as you can without running or hurting yourself. You will begin after I say ‘Ready, 3, 2, 1, Go!’ As you pass the cone, do not stop or slow down. When I tell you to stop, stop where you are on the path until I come to you.

Demonstrate task and say: Watch me as I show you. You see that I am walking fast but not running and that I am not slowing or stopping when I pass the cone. Do you have any questions? Answer questions as necessary.

Ask participant to walk course once down and back; say: Now you can practice. Walk the path, out and back one time; go around the cone without slowing down. Ready, 3, 2, 1, Go! When participant is finished, say: Do you have any questions? Answer any questions participant has.

Continue: This time, I will be timing you. Remember, when I say ‘Go,’ walk back and forth around the cones as fast as possible for 2 minutes without running or hurting yourself. Ready, 3, 2, 1, Go!

Examiner should begin timing and marking off laps on lap grid as they are completed; specifically, each time participant goes around a cone, mark off a number on data sheet grid (all turns around cone away from examiner should be odd numbers and all turns around cone nearest examiner should be even numbers).
At the same time, examiner should provide the following feedback:*  

1 minute: You are doing well. You have 1 minute to go.

*If participant is resting at one-minute reminder, encourage him/her to continue and change statement to: You have only 1 minute left. Rest as long as you need; start walking again as soon as you feel able to do so.

When time reads 1:45, tell the participant: In a moment, I’m going to ask you to stop. When I do, just stop right where you are and I will come to you. When five seconds remain, examiner should count down: 5, 4, 3, 2, 1, stop.

Put a piece of tape on the floor to mark where participant stopped; the tape should be placed behind the participant’s heel. Measure distance from the last lap to the tape. Put distance on the record sheet and later transfer it to computer.
NIH Toolbox
Motor Domain Data Collection Form

Date _____ / _____ / _______  Participant ID _____________

Handedness:  Right  Left  Not known (circle)

<table>
<thead>
<tr>
<th>Test</th>
<th>MM:SS.00</th>
<th>MM:SS.00</th>
<th>Unable to complete</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-hole Pegboard</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grip Strength</td>
<td>lbs</td>
<td>lbs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 meter Walk Test (trial 1)</td>
<td>MM:SS.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 meter Walk Test (trial 2)</td>
<td>MM:SS.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 Minute Walk Test

LAP GRID (cross off each time participant rounds a cone).

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

<table>
<thead>
<tr>
<th># Turns</th>
<th>2 minute walk course map</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional # 10ft marks</td>
<td>10ft 10ft 10ft 10ft 10ft</td>
</tr>
<tr>
<td>Additional feet &amp; inches</td>
<td>Feet inches</td>
</tr>
<tr>
<td>Did the participant stop (circle)</td>
<td>Yes  No</td>
</tr>
<tr>
<td>Unable to complete (circle)</td>
<td>Yes  No</td>
</tr>
<tr>
<td>If yes, time at 1st stop:</td>
<td>Minutes  Seconds</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
</tr>
</tbody>
</table>
Setup for 2-Min and 4-M Walking Test

- 5 Feet
- 10 Feet
- 10 Feet
- 10 Feet
- 10 Feet
- 10 Feet
- 5 Feet

4 Meters
1 Meter
Emotion

This domain is self-administered on the computer. Each participant is presented with a series of self-report questions that tap into four sub-domains of emotional well-being: Psychological Wellbeing, Negative Affect, Stress and Self-Efficacy, and Social Relationships. These sub-domains are further divided into more precise aspects as illustrated in the table below:

<table>
<thead>
<tr>
<th>General Aspect</th>
<th>Precise Aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological Wellbeing</td>
<td>Life satisfaction</td>
</tr>
<tr>
<td></td>
<td>Meaning &amp; purpose</td>
</tr>
<tr>
<td></td>
<td>Positive affect</td>
</tr>
<tr>
<td>Negative Affect</td>
<td>Sadness</td>
</tr>
<tr>
<td></td>
<td>Fear</td>
</tr>
<tr>
<td></td>
<td>Anger</td>
</tr>
<tr>
<td>Stress and Self-Efficacy</td>
<td>Self-efficacy</td>
</tr>
<tr>
<td></td>
<td>Perceived stress</td>
</tr>
<tr>
<td>Social Relationships</td>
<td>Social support</td>
</tr>
<tr>
<td></td>
<td>Companionship</td>
</tr>
<tr>
<td></td>
<td>Social distress</td>
</tr>
<tr>
<td></td>
<td>Positive social development*</td>
</tr>
</tbody>
</table>

*child proxies only

Introduction

Emotion items are presented for self-report; the participant answers at his/her own speed. The examiner need not be involved. After a question is answered, the screen advances automatically to the next question. For the youngest age group and some school age children, parents or guardians answer some surveys as proxies.

If a participant (child or adult) has difficulty using the mouse, the examiner may operate the mouse for him/her. The examiner should say something like the following to the participant: You can point to your choice and then I will use the mouse to click on it for you in English or Señala la imagen que quieras elegir y yo haré clic en ella con el ratón (Ages 8-17) and Señale la imagen que quiere elegir y yo haré clic en ella con el ratón (Ages 18-85) in Spanish.
EMOTION

Adults, children, and child proxies each receive slightly different instructions on the screen. These are given below.

For Adults (ages 18-85):

On the next screens, we will ask you questions about your thoughts, feelings and behaviors. Read each question carefully and answer as well as you can. There is no right or wrong answer, only what is true for you and describes your thoughts, feelings, and behaviors. Some questions may seem similar to ones you have already answered. This is intentional. Please consider each question by itself and choose an answer that shows how you behave or what you really feel or believe.

After you make your choice, the computer will automatically go on to the next question. If you want to change your answer, click on the GO BACK button to return to the question, then choose a different answer.

Click on the NEXT button when you are ready to begin.

For Children (ages 8-17):

On the next screens, we will ask you questions about your thoughts, feelings and behaviors. Read each question carefully and answer as well as you can. There is no right or wrong answer, only what is true for you and describes your thoughts, feelings, and behaviors. Some questions may seem like ones you have already answered. This is intentional. Please think about each question by itself and choose the answer that shows how you behave or what you really feel or believe.

After you make your choice, the computer will automatically go on to the next question. If you want to change your answer, click on the GO BACK button to return to the question, then choose a different answer.

Click on the NEXT button when you are ready to begin.

For Child Proxies (ages 3-12):

On the next screens, you will see questions about your child’s feelings and behaviors. Read each question carefully and answer as best you can. There is no right or wrong answer, just answer what you believe accurately describes your child’s feelings and behaviors. Some questions may seem similar to ones you have already answered. This is intentional. Please consider each question by itself and choose an answer that shows what you really feel or believe about your child.

After you make your choice, the computer will automatically go on to the next question. If you want to change your answer, click on the GO BACK button to return to the question, then choose a different answer.

Click on the NEXT button when you are ready to begin.
Pain Surveys

Equipment:
Computer
Monitor
Mouse or keyboard

Description:
Two instruments (Promis Pain Interference CAT and Pain Intensity) make up the measurement of this construct. Each is self-administered; for each, instructions are presented on the computer screen. Both instruments are presented as one measure to the participant.

The Promis Pain Interference CAT asks participants about how their experience of pain interfered with or affected their enjoyment of various daily activities in the past seven days. The scale is computer-adapted and has a minimum of four questions and a maximum of twelve questions. The questions ask for a response on a 5-point scale. Some of the items are rated: Not at all; A little bit; Somewhat; Quite a bit; Very much; other items are rated: Never; Rarely; Sometimes; Often; Always.

Pain Intensity consists of one item asking about the participant’s level of pain in the past seven days. Participants are asked to rate their pain on a scale from 0 (no pain) to 10 (worst imaginable pain).
**Odor Identification**

**Materials:**
- Laptop
- Monitor
- Scratch 'n' Sniff cards
- Scratcher (e.g., guitar pick)

**Description:**
This task assesses the ability to identify various odors. Before identifying the odors, the child participants (ages 3-9 years) are asked to identify the eight pictures that are used as answer choices. Having identified the pictures, they are asked if they have tasted or smelled the objects or foods depicted. All participants (ages 3-85 years) use scratch 'n' sniff cards. After scratching them, participants are asked to identify which of four pictures on the screen matches the odor they have just smelled. Children ages 3 to 9 are handed cards that the examiner scratched and are asked to identify five odors; participants ages 10 to 85 are asked to scratch and identify nine odors.

In English, two versions of the instructions are available: one for 3-9 year olds and one for 10-85 year olds. In Spanish, three versions of the administration instructions are available: one for 3-9 year olds, one for 10-17 year olds, and one for 18-85 year olds.

If either a child or adult participant has difficulty using the mouse, he/she may point and the examiner may operate the mouse. When this happens, the examiner should say something like the following to the participant: **You can point to the picture you want and then I will use the mouse to click on it for you** in English or **Señala la imagen que quieras elegir y yo haré clic en ella con el ratón** (ages 3-17) and **Señale la imagen que quiera elegir y yo haré clic en ella con el ratón** (ages 18-85) in Spanish. Similarly, if a participant has trouble reading picture labels, the examiner may read the labels for him/her.
Odor Identification Test Instructions

For this age group, there are two parts to the instructions: picture identification and odor identification.

Part 1: Picture Identification:
The child is presented with a screen that shows eight pictures: Popcorn, Flower, Lemon, Play Doh, Bubble Gum, Chocolate, Coffee, and Cinnamon. Each question and a form to record the child’s responses will appear one at a time on the examiner’s screen.

The examiner should say: Now, we’re going to look at some pictures. I want to see if you know what they are.

Question 1: Say: Point to the picture of a flower. If incorrect, point to the flower and say: This is a flower. Mark correct (Yes) or incorrect (No) on the examiner screen. Say: Have you ever smelled a flower? Mark yes or no on the examiner screen.

Question 2: Say: Point to the picture of popcorn. If incorrect, point to the popcorn and say: This is popcorn. Mark correct (Yes) or incorrect (No) on the examiner screen. Say: Have you ever tasted or smelled popcorn? Mark yes or no on the examiner screen.

Question 3: Say: Point to the picture of lemon. If incorrect, point to the picture of the lemon and say: This is lemon. Mark correct (Yes) or incorrect (No) on the examiner screen. Say: Have you ever tasted or smelled lemon? Mark yes or no on the examiner screen.

Question 4: Say: Point to the picture of Play Doh. If incorrect, point to the picture of Play Doh and say: This is Play Doh. Mark correct (Yes) or incorrect (No) on the examiner screen. Say: Have you ever smelled Play Doh? Mark yes or no on the examiner screen.

Question 5: Say: Point to the picture of cinnamon. If incorrect, point to the picture of cinnamon and say: This is cinnamon. Mark correct (Yes) or incorrect (No) on the examiner screen. Say: Have you ever tasted or smelled cinnamon? Mark yes or no on the examiner screen.

Question 6: Say: Point to the picture of coffee. If incorrect, point to the picture of coffee and say: This is coffee. Mark correct (Yes) or incorrect (No) on the examiner screen. Say: Have you ever smelled coffee? Mark yes or no on the examiner screen.

Question 7: Say: Point to the picture of chocolate. If incorrect, point to the picture of chocolate and say: This is chocolate. Mark correct (Yes) or incorrect (No) on the examiner screen. Say: Have you ever tasted or smelled chocolate? Mark yes or no on the examiner screen.
Question 8: Say: **Point to the picture of bubble gum.** If incorrect, point to the picture of bubble gum and say: **This is bubble gum.** Mark correct (Yes) or incorrect (No) on the examiner screen. Say: **Have you ever smelled or tasted bubble gum?** Mark yes or no on the examiner screen.

At the end of these questions, the examiner's screen will be refreshed with the names of those pictures that were not correctly identified on the first trial. These items will appear on the examiner’s screen one at a time and are to be repeated with the instruction: '**Point to the picture of....**' Again, the examiner will mark correct or incorrect, correcting the child for any errors in identification by saying: **This is....** (Note: the examiner should not repeat the ‘Have you ever smelled...’ question to the child.) Regardless of the child’s performance on the picture identification task, the computer will then move on to odor identification.

**Part 2: Odor Identification:**

**Scratch ‘n’ Sniff Card Note:** The odor on the card is strongest immediately after being scratched; the examiner may need to remind the participant to smell the card as quickly as possible after scratching it. If the child says he/she does not smell anything, the examiner should scratch the card one more time and place it directly under his/her nose, then ask the child to **make his/her best guess if he/she is not sure.**

For this age group, the examiner will scratch the card and hand it to the participant, saying: **I am going to give you some stickers to smell.** After you have smelled the sticker, click on the picture that shows what you just smelled. If you want to change your choice, click on the hand, also called the GO BACK button. Let’s begin. If the participant is having difficulty using the mouse, the examiner may operate the mouse (see note above).

**NOTE:** The child is not permitted to go back beyond the last item he/she attempted; if the child attempts to go back beyond the previous item, say: **You can only go back to the last item you smelled.**

When the child has completed all five cards, say: **We are done with the smells.**

The five odors presented are: Lemon, Play Doh, Bubble Gum, Chocolate, and Popcorn.
Below is a participant screen similar to the ones used in this task:
Odor Identification Test Instructions

Before beginning the task, the examiner says: This task involves smelling various odors, one at a time, and then trying to identify them. The odors that you will smell are chosen from a variety of foods and objects that people experience in everyday life. We are using scratch 'n' sniff cards to present the odors.

The examiner continues: Take this scratcher and scratch the first card; smell it right after you scratch it, then look at the pictures on the screen. Click on the picture that best shows the odor you smelled on the card. A new set of pictures will then appear on the screen and you will be asked to identify the odor on the next card. If you want to change your last answer, click on the GO BACK button.

Scratch ‘n’ Sniff Card Note: The odor on the card is strongest immediately after being scratched. The examiner may need to remind the participant to smell the card as quickly as possible after scratching it. If the participant says he/she does not smell anything, the examiner should scratch the card one more time and place it directly under his/her nose, then ask him/her to make his/her best guess if he/she is not sure.

The examiner should encourage the participant to smell the card more than once if needed.

If the participant has difficulty using the scratcher, the examiner may scratch the card and hand it to the participant.

The examiner should repeat this sequence of handing the cards to the participant to scratch, smell, and identify until all the cards have been used. For each trial, or as needed, repeat what was said above: Take this scratcher and scratch this card; smell it, then look at the pictures on the screen. Click on the picture that best shows the odor that you smelled on the card. If you want to go back to change your last answer, click on the GO BACK button.

NOTE: The participant is not permitted to go back beyond last item he/she attempted. If the participant attempts to go back beyond the previous item, say: You can only go back to the last item you smelled.

When the participant has completed all nine cards, say: You have finished this activity.

The nine odors presented are: Lemon, Play Doh, Bubble Gum, Chocolate, Popcorn, Coffee, Smoke, Natural Gas, and Flower.
Below is a participant screen similar to the ones used in this task:
Visual Acuity Test

**Materials:**
Laptop computer and 19 inch monitor
15 foot VGA cable to enable monitor to be placed 12.5 feet from the participant
Laminated card with HOTV letters (for ages 3-7 only)
Chair (with booster seat if needed for smaller children)
Table for placement of the monitor

**Description:**
This activity is intended to measure visual acuity in adults and children.

Testing will use different sets of optotypes (letters) for children and adults. For both the Visual Acuity and Dynamic Visual Acuity measures, the participants are to be seated 12.5 feet away from the viewing monitor. The monitor should be at eye level.

Before testing begins, the examiner should move the monitor to a table that is 12.5 feet away from the participant.

Before testing begins, ascertain if the participant wears corrective lenses for distance, and ensure he/she is wearing them. If the participant does wear lenses but indicates he/she has forgotten them (or does not have them for any reason), the examiner may choose to continue testing or not; it is at the examiner’s discretion. However, if the participant requires a very strong correction, testing without corrective lenses will not likely be valid. The examiner should note any such irregularities and, if testing is completed, should interpret results with caution.

Participants who wear glasses, and will be administered the Dynamic Visual Acuity Test after the Visual Acuity Test, are asked if they have progressive or multifocal lenses. If their answer is affirmative, they will be administered the Visual Acuity Test under two conditions – one with their glasses on and the next without their glasses. The second administration is included in the Dynamic Visual Acuity Test.
Visual Acuity Test Instructions

Because a number of children may not be able to name one or more of the letters HOTV, a laminated card is also used with young participants, allowing them to point to what they saw on the screen without verbalizing. The accompanying adult may sit next to the child and report to the examiner which letter the child chose, if desired. A brief training is included in the test, followed by practice, to assure that the child knows what needs to be done to complete the assessment. If the child does not succeed in the training (as outlined below), testing should be discontinued.

Training:

Once the child is seated in a chair that is 12.5 feet from the monitor, say: Now we are going to do an activity that shows us how well you can see pictures on the TV screen. Hand the child the laminated card and say: Everything you will see is shown on this card. This is a picture of an H, this is a picture of an O, this is a picture of a T, and this is a picture of a V (point to each letter while naming). Now, you try to name the pictures.

Encourage the child to name the letters as best he/she can. If the child names all four letters correctly, say: Good job.

If any are named incorrectly, point to each letter and say only one time as before: This is a picture of an H, this is a picture of an O, this is a picture of a T, and this is a picture of a V. (Because letter naming is not required to complete the test, it is OK if the child does not correctly name each letter. Encourage the child’s efforts without providing negative feedback.) Then say: Let’s do some more.

Say: You are going to look on this screen (point to monitor); then, you will see a picture (for children who clearly know the alphabet, it is OK to say letter instead of picture). Each time, I want you to tell me or point on this card to what you saw on the screen. If you are not sure, it is OK to guess. Are you ready to start? Let’s begin.

Practice:

The examiner should click the START TEST button on the examiner’s screen. The examiner will present one set of practice visual acuity trials (four letters) at size 20/400.

a. If the child gets three or more correct, continue to visual acuity testing.

b. If the child misses two or more of four, review the laminated pointing chart and ask him/her to identify (either orally or by pointing) the four letters HOTV. If all are done correctly, see step c below. If child cannot correctly identify the optotypes on the HOTV set, repeat the training above one more time.
c. Proceed to a second practice trial set. If three or more of four are done correctly, proceed to live visual acuity testing. If not, repeat (third practice trial set). If three or more are correct on the third practice trial, begin visual acuity testing. If two or more are incorrect, stop the test since this is the third practice trial (d below).

d. Practice trials should be limited to a total of three sets. If, after three trials, the criterion of three or more of four correct is not achieved, then stop the test.

Visual Acuity Testing:

The examiner should say: You did great. Now, the letters will get smaller and smaller until you cannot really see them. That is ok. We want to know how small they can get before you cannot see them.

The examiner should click NEXT on the examiner’s screen. Each time a letter is displayed, say: Tell me or point to what you see.

It is the examiner’s job to use the computer to record (click) whether the response was correct or incorrect. Simply note the child’s verbal or pointing response, compare it to the correct answer listed on the examiner’s screen, and score it accordingly. The next item will not appear until the examiner has scored the item currently on screen. If the child is trying but struggling to verbalize the letters, remind him/her that pointing is OK, saying: You can show me what you see.

The test will progressively present smaller letters if the child answers correctly or larger ones if the child answers incorrectly, until an acuity score is established. The test will automatically end when the computer has calculated the acuity score. The examiner should click the NEXT button to move on to the next section.

Note: If a child’s Visual Acuity Test score is equivalent to 20/400 vision or worse, the program does not allow the examiner to administer the Dynamic Visual Acuity Test, because the results would not be valid. Specifically, if a child scores poorly on this test, it suggests serious uncorrected distance vision deficits exist. A follow-up evaluation by a vision professional is suggested.
Visual Acuity Test Instructions

Ask the participant if he/she wears glasses or contact lenses for distance vision. If the participant does wear lenses but indicates he/she has forgotten them (or does not have them for any reason), the examiner may choose to continue testing or not; it is at the examiner’s discretion. Moreover, if the participant requires a very strong correction, testing will not likely be valid without the corrective lenses. The examiner should note any such irregularities and, if testing is completed in such a case, the results should be interpreted with caution.

Once the participant is seated in a chair that is 12.5 feet from the monitor, say: Now we are going to do an activity where you will tell me what letters you see on the screen. You are going to look on this screen (point to monitor) and you will see a letter. Each time, I want you to tell me the letter you saw on the screen. If you are not sure, it is OK to guess. The letters will get smaller and smaller until you cannot really see them. That is ok. We are trying to determine how small they can get before you cannot see them. Are you ready to start? Let’s begin.

Visual Acuity Test (with glasses or contact lenses if usually worn for distance vision):

Opening examiner screen for Visual Acuity Test

The examiner should click the START TEST button on the examiner’s screen. Each time a letter is displayed, say: Tell me, what letter is this? (At the examiner’s discretion, this can be replaced by: Go ahead after a few letters have been displayed.)
It is the examiner’s job to use the computer to record whether the response was correct or incorrect by clicking either the **Yes** (correct) or **No** (incorrect) button. Simply note the participant’s response, compare it to the correct answer listed on the examiner’s screen, and score it accordingly. The next item will not appear until the examiner has scored the item currently on screen (but it will appear immediately after the examiner clicks Yes or No).

The test will progressively present smaller letters if the participant answers correctly and larger ones if the participant answers incorrectly, until an acuity score is found. The test will automatically end when the computer has calculated the acuity score.

**Note:** If a participant’s Visual Acuity Test score is equivalent to 20/400 vision or worse, the program does not allow the examiner to administer the Dynamic Visual Acuity Test, because the results would not be valid. Specifically, if a participant scores poorly on the Visual Acuity Test, it suggests serious uncorrected distance vision deficits. A follow-up evaluation by a vision professional is suggested.
Dynamic Visual Acuity (DVA)

Materials:
- Computer and mouse
- Rate sensor on data acquisition board (DAQ, small box) attached to adjustable headgear
- Headgear plugged into laptop (after computer is running)
- Size adaptor (such as stocking cap) for small heads
- Isopropyl alcohol (wipes or spray) for disinfecting headgear for each new participant

Description:
This activity is intended to measure deficits of the vestibular ocular reflex in adults and children. A brief training is included in the test to ascertain that the participants, both child and adult, know what needs to be done to complete the assessment. This is followed by a set of practice items. If participants do not succeed on the practice, testing will be discontinued.

Set-up:
The equipment for the Dynamic Visual Acuity Test should be set up at the same time as the Visual Acuity Test equipment:
- The cable from the DAQ should be plugged into your laptop’s USB port. It must be plugged in before launching this test within the software and it must be plugged in after the computer is turned on. The headgear is placed on the participant at the start of the Dynamic Visual Acuity Test (after the Visual Acuity Test has been completed). These instructions are reviewed in the Introduction to the Computer and Special Equipment section of the Training Manual.

NOTE: This measure is not integrated into the software platform (Assessment Center) with the other tests. Follow the directions below to start and launch the test. A warning screen will appear if the examiner forgets to launch the application from the desktop.

Starting the DVA program:
When the DVA opening screen (see below) appears on the examiner’s screen, the examiner should click Start Test.
Opening Screen in NIH Toolbox

The examiner is instructed to close the browser, go to the desktop on the monitor and double-click the DVA Icon. The first screen in the DVA program requires the examiner to register the participant; this is done by putting the participant’s PIN number and the study name into the registration screen (shown below) and clicking Continue.

Opening Screen in DVA Application
The **Visual Acuity Test** must be administered prior to the **DVA**. If it was not administered prior to the **DVA**, it can be administered using the **DVA** software program. Moreover, participants who wear glasses are asked if they have progressive or multifocal lenses. If their answer is affirmative, they will be administered the **Visual Acuity Test** a second time without their glasses as a part of the **DVA**. If the **Visual Acuity Test** is administered only within **DVA**, the examiner should print out the Visual Acuity Instructions before beginning the administration.

If not asked in the **Visual Acuity Test**, ask the participant if he/she wears glasses or contact lenses for distance vision. If the participant does wear lenses but indicates he/she has forgotten them (or does not have them for any reason), the examiner may choose to continue testing or not; it is at the examiner’s discretion. Moreover, if the participant requires a very strong correction, testing will not likely be valid without the corrective lenses. The examiner should note any such irregularities and, if testing is completed in such a case, should interpret results with caution.

Testing will use different sets of optotypes (letters) for children and adults. For both the **DVA** and the **Visual Acuity Test**, the participants are to be seated **12.5 feet** away from the viewing monitor. The monitor should be at eye level.

The **DVA** has both a training part and practice items. The test itself is divided into Part 1 (right) and Part 2 (left); the letter will only flash for a rightward (Part 1) head rotation and then leftward (Part 2) head rotation. However, the participant makes head rotations to both sides (as if saying NO), not in one direction only, so there is no change in instructions. When the test is completed, the participant’s screen goes blank and the letters will no longer flash. The examiner should click **NEXT** at the bottom of his/her screen to move on to the next measure.
Dynamic Visual Acuity Test (DVA) Instructions

Introduction:
The participant must have completed the Visual Acuity Test before starting this measure. If he/she has not completed the Visual Acuity Test, it will be administered automatically as a part of the DVA program before the DVA testing begins. If this is the case, review Visual Acuity Test instructions that are appended to the end of these instructions.

The examiner must explain to the participant that he/she must wear the headgear (hat) to enable the computer to know if his/her head is turning. For young children, it may be helpful to embellish the headgear with decorations, to encourage them to wear it.

Show the headgear with rate sensor to the child, saying something like the following (adapt as needed): Now we are going to do the same activity, but this time you will move your head back and forth as if saying NO. If you move it just right, the letters will appear. This special hat will be on your head so the computer can know if your head is moving just right. If it is, the pictures will show up!

Say: To make a picture appear on the screen, you need to move your head, like you are saying NO, or UH-UH. Watch me. Demonstrate; then say: Now you try it. Shake your head like you are saying NO. Give appropriate feedback until the child demonstrates an understanding of the required motion.

Then say: Now let’s put the special hat on and try this. Can you help me put the hat on your head? Place the headgear securely on the child’s head, making sure it is comfortable and correctly adjusted (rate sensor should be on right side of head, with headgear adjustment knob at the back of the head). For small children, the examiner may need to put a stocking cap or other type of form-fitting, child-pleasing hat under the headgear to ensure a snug fit.

A brief training precedes the test to ascertain that the participants, both child and adult, know what needs to be done to complete the assessment. The training is followed by practice items. If participants do not succeed on the practice, testing will be discontinued.

Training
When the headgear is properly positioned, say: This time when you shake your head, a picture will flash on the screen. I want you to tell me, or point to, what you see each time. It is OK to make your best guess. When you see the picture flash on the screen, stop shaking your head.
Using a practice trial at 20/400 size, have the child make the pictures appear with the correct head movement. The examiner can judge the correctness of the movement by watching the moving vertical bar on the computer screen (whether it is in the green range or not -- between the numbers 180 and 250).

The examiner may need to demonstrate again; the purpose of the training is to make sure the child has learned to move his/her head correctly. It is important that the size of the head movement is not too large. If so, the child will not be able to see the letter. The movement amount should be small and quick (like shaking the head NO). Try to make this part fun. If done correctly, give the child praise. If not correct, the examiner should demonstrate while directly in front of the child. To start training, click **START**.

Practice:

Once the child has learned to move his/her head correctly, a practice series with the **HOTV** letters at size 20/400 is displayed. The child receives ten trials (each trial involves up to three flashes of each letter) and is asked to identify the letters by either pointing to or saying the letters. The child needs to achieve 60 percent (six of the ten trials) correct to continue with testing. When five practice trials are incorrect, the test is automatically discontinued. Alternatively, as soon as the child gets six practice items correct, the program moves on. The practice items will measure leftward head rotation; testing begins with rightward rotation.
Visual Acuity Testing:

Click the **START TEST** button and say: **Now we are going to do some more of these. Ready? Go ahead.**

The letters will begin at three sizes above the achieved **Visual Acuity Test score** and will become progressively smaller or larger, depending on the child’s performance. A given letter will flash up to three times during head rotation. The child should be encouraged not to answer until he/she is certain which letter flashed; however, after three letter flashes, the letter will no longer appear, regardless of head movement.

If the child has not responded, seems uncertain about his/her answer, or has not used all three trials, the examiner should prompt the child each time by saying something like: **Go ahead** or **Now shake your head NO**. If the child is trying but struggling to verbalize the letters, remind him/her that pointing is OK, saying: **You can show me what you saw**. The examiner should provide encouragement and praise regardless of whether the letter identified is correct, so that the child will continue.

The examiner should record whether the response was correct or incorrect by clicking either the **Yes** or **No** button. The next item will not appear until the examiner has scored the item currently on screen.

The examiner should remind the child as needed that after he/she says or points to a letter in response to what flashed on the screen, he/she should **stop the head-shaking and wait for the examiner to indicate that it is time for the next item** (the letter flashes up to 3 times and the examiner may need to remind the child to stop shaking his/her head while the examiner enters the response).

If the child sees the presentation of a letter multiple times (up to three are possible) and provides different responses, the examiner should go with the dominant response. In a case where the child gives different responses each time, the examiner should score the child’s last response to the flashing letter presentation. The test will progress and automatically end when the child reaches the discontinue criterion, or he/she has correctly identified the smallest-size letters presented.

The test is divided into Part 1 (right) and Part 2 (left), meaning that the letter will only flash for a rightward (Part 1) head rotation and then leftward (Part 2) head rotation. Since the participant makes head rotations to both sides (as if saying NO), not in one direction only, no change in instructions to the participant is necessary. When the test is completed, the letters will no longer flash.

The computer automatically ends the test after it has determined the dynamic acuity score; then say: **We’re all done with this activity.**
Visual Acuity Test Instructions

Because a number of children may not be able to name one or more of the letters HOTV, a laminated card is also used with young participants, allowing them to point to what they saw on the screen without verbalizing. A brief training is followed by practice, to assure that the child knows what needs to be done to complete the assessment. If the child does not succeed in the training (as outlined below), testing should be discontinued.

Training:

Once the child is seated in a chair that is 12.5 feet from the monitor, say: Now we are going to do an activity that shows us how well you can see pictures on the TV screen. Hand the child the laminated card and say: Everything you will see is shown on this card. This is a picture of an H, this is a picture of an O, this is a picture of a T, and this is a picture of a V (point to each letter while naming). Now, you try to name the pictures.

Encourage the child to name the letters as best he/she can. If the child names all four letters correctly, say: Good job.

If any are named incorrectly, point to each letter and say only one time as before: This is a picture of an H, this is a picture of an O, this is a picture of a T, and this is a picture of a V. (Because letter naming is not required to complete the test, it is OK if the child does not correctly name each letter. Encourage the child’s efforts without providing negative feedback.) Then say: Let’s do some more.

Say: You are going to look on this screen (point to monitor); then, you will see a picture (for children who clearly know the alphabet, it is OK to say letter instead of picture). Each time, I want you to tell me or point on this card to what you saw on the screen. If you are not sure, it is OK to guess. Are you ready to start? Let’s begin.

Practice:

The examiner should click the START TEST button on the examiner’s screen. The examiner will present one set of practice visual acuity trials (four letters) at size 20/400.

a. If the child gets three or more correct, continue to visual acuity testing.

b. If the child misses two or more of four, review the laminated ‘pointing chart’ and ask him/her to identify (either orally or by pointing) the four letters HOTV. If all are done correctly, see step c below. If child cannot correctly identify the optotypes on the HOTV set, repeat the training above one more time.

c. Proceed to a second practice trial set. If three or more of four are done correctly, proceed to live visual acuity testing. If not, repeat (third practice trial set). If three or more are correct on the third practice trial, begin visual acuity testing. If two or more are incorrect, stop the test since this is the third practice trial (step d below).
d. Practice trials should be limited to a total of three sets. If, after three trials, the criterion of three or more of four correct is not achieved, then stop the test.

Visual Acuity Testing:

The examiner should say: You did great. Now, the letters will get smaller and smaller until you cannot really see them. That is ok. We want to know how small they can get before you cannot see them.

The examiner should click NEXT on the examiner’s screen. Each time a letter is displayed, say: Tell me or point to what you see.

It is the examiner’s job to use the computer to record (click) whether the response was correct or incorrect. Simply note the child’s verbal or pointing response, compare it to the correct answer listed on the examiner’s screen, and score it accordingly. The next item will not appear until the examiner has scored the item currently on screen. If the child is trying but struggling to verbalize the letters, remind him/her that pointing is OK, saying: You can show me what you see.

The test will progressively present smaller letters if the child answers correctly or larger ones if the child answers incorrectly, until an acuity score is established. The test will automatically end when the computer has calculated the acuity score. The examiner should click the NEXT button to move on to the next section.
Dynamic Visual Acuity Test (DVA) Instructions

Introduction

The participant must have completed the Visual Acuity Test before starting this measure. If he/she has not completed the Visual Acuity Test, it will be administered automatically as a part of the DVA program before the DVA testing begins. If this is the case, review Visual Acuity Test instructions that are appended to the end of these instructions.

For participants who wear glasses and can understand the question, the examiner should ask: Are your glasses progressive or multifocal?

- If the answer is YES, then the examiner should administer Visual Acuity Test 2 if he or she plans to administer the Dynamic Visual Acuity Test. If this is the case, review Visual Acuity Test instructions that are appended to the end of these instructions.

- If the answer is NO, the examiner should not administer Visual Acuity Test 2 – only the Dynamic Visual Acuity Test (and one Visual Acuity Test, if it has not been already administered).

NOTE: For participants with glasses that are multifocal or who have progressive lenses, DVA testing should be done without glasses. A second administration of the Visual Acuity Test is included in the DVA for these persons. Other participants wearing single-vision lenses should continue to wear them for the DVA assessment.

The examiner must explain to the participant that he/she must wear the headgear to enable the computer to know if his/her head is turning. Show the headgear with rate sensor to the participant, saying something like the following (adapt as needed): Now we are going to do some more, but this time, you need to wear this special headband to make the letters appear. May I put it on your head now?

Place the headgear securely on the participant’s head, making sure it is comfortable and correctly adjusted (rate sensor should be on right side of head, with headgear adjustment knob at the back of the head).

When the headgear is properly positioned, say: To make a letter appear on the screen, you need to move your head, like you are saying NO. Watch me. Demonstrate for the participant; then say, Now you try it. Shake your head like you are saying NO.

A brief training precedes the test to ascertain that the participants, both child and adult, know what needs to be done to complete the assessment. The training is followed by practice items. If participants do not succeed on the practice, testing will be discontinued.
Training:
Using a practice trial at 20/400 size, sit with the participant and have him/her make the letters appear with the correct head movement. The examiner can judge the correctness of the movement by watching the moving vertical bar on the computer screen and whether it is in the green range or not (between the numbers 180 and 250). If the participant is not making the correct movement, the examiner may need to demonstrate again; the purpose of this training is to make sure the participant has learned to move his/her head correctly.

Practice:
Once the participant has learned to move his/her head correctly, there is a practice series with the letter size set at 20/400.

Now the examiner should say: This time when you shake your head, a letter will flash on the screen. I want you to tell me what you see each time. It is OK to make your best guess. Once you recognize the letter on the screen, stop shaking your head and tell me your answer.

The participant receives ten trials (each trial involves up to three flashes of each letter) and is asked to identify the letters by saying them out loud. The participant needs to achieve 60 percent (six of the ten trials) correct to continue testing. When five practice trials are incorrect, the test is automatically discontinued. Alternatively, as soon as the participant gets six practice items correct, the program moves on. The practice items will measure leftward head rotation; testing begins with rightward rotation.
Testing:

Click **START TEST**; say: **Now we are going to do some more of these. The letters will be smaller than the ones we just practiced with. Ready? Go ahead.**

The letters will begin at **three sizes larger** than the achieved Visual Acuity score and will become progressively smaller or larger, depending on the participant’s performance. A given letter will flash up to three times during head rotation. The participant should be encouraged not to answer until he/she is certain which letter flashed, although after three letter flashes, the letter will no longer appear, regardless of head movement.

The examiner should use the computer to record whether the response was correct or incorrect by clicking either the **Yes** or **No** button. The next item will not appear until the examiner has scored the item currently on screen (but will be available to appear – prompted by the participant’s head-shaking – after the examiner has scored the previous item).

If the participant does not appear to have seen the letter flash or is in any way unsure of his/her response, allow him/her up to the full three attempts at the letter. The examiner should prompt the participant each time by saying something like, **Go ahead** or **Now shake your head NO again.**

The examiner should remind the participant as needed that after he/she says a letter in response to what flashed on the screen, he/she should **stop the head-shaking and wait for the examiner to indicate that it is time for the next item** (the letter flashes up to three times and the examiner may need to remind the participant to stop shaking his/her head while the examiner enters the response).

If the participant sees the presentation of a letter multiple times (up to three are possible) and provides different responses, the examiner should go with the dominant response. In a case in which the participant gives different responses each time, the examiner should score the participant’s last response to the flashing letter presentation. The test will progress and automatically end when the participant reaches the discontinue criterion, or he/she has correctly identified the smallest-size letters presented.

The test is divided into Part 1 (right) and Part 2 (left), meaning that the letter will only flash for a rightward (Part 1) head rotation and then leftward (Part 2) head rotation. Since the participant makes head rotations to both sides (as if saying **NO**), not in one direction only, no change in instructions to the participant is necessary. When the test is completed, the letters will no longer flash.

The computer automatically ends the test after it has determined the dynamic acuity score; then say: **We’re all done with this activity.**
Visual Acuity Test 1 and Visual Acuity Test 2 Instructions:

Once the participant is seated in a chair that is 12.5 feet from the monitor, say: **Now we are going to do an activity where you will tell me what letters you see on the screen. You are going to look on this screen** (point to monitor) **and you will see a letter. Each time, I want you to tell me the letter you saw on the screen. If you are not sure, it is OK to guess. The letters will get smaller and smaller until you cannot really see them. That is ok. We are trying to determine how small they can get before you cannot see them. Are you ready to start? Let’s begin.**

**Visual Acuity Test (with glasses or contact lenses if usually worn for distance vision):**

The examiner should click the **START TEST** button on the examiner’s screen. Each time a letter is displayed, say: **Tell me, what letter is this?** (At the examiner’s discretion, this can be replaced by: **Go ahead** after a few letters have been displayed.)

It is the examiner’s job to use the computer to record whether the response was correct or incorrect by clicking either the **Yes** (correct) or **No** (incorrect) button. Simply note the participant’s response, compare it to the correct answer listed on the examiner’s screen, and score it accordingly. The next item will not appear until the examiner has scored the item currently on screen (but it will appear immediately after the examiner clicks Yes or No).

The test will progressively present smaller letters if the participant answers correctly and larger ones if the participant answers incorrectly, until an acuity score is found. The test will automatically end when the computer has calculated the acuity score.

**Visual Acuity Test 2 (only for those participants with glasses that are multifocal or who have progressive lenses):**

Say: **Now we are going to do this test again, this time without your glasses.**

When the participant has removed his/her glasses, the examiner should click the **START TEST** button on the examiner’s screen. Each time a letter is displayed, say: **Tell me, what letter is this?** (At the examiner’s discretion, this can be replaced by: **Go ahead** after a few letters have been displayed.) It is the examiner’s job to use the computer to record whether the response was correct or incorrect by clicking either the **Yes** (correct) or **No** (incorrect) button. Simply note the participant’s response, compare it to the correct answer listed on the examiner’s screen, and score it accordingly. The next item will not appear until the examiner has scored the item currently on screen (but it will appear immediately after the examiner clicks Yes or No).

The test will progressively present smaller letters if the participant answers correctly and larger ones if the participant answers incorrectly, until an acuity score is found. The test will automatically end when the computer has calculated the acuity score.
Hearing Threshold Test

**Equipment:**
Monitor
Keyboard
Mouse
Laptop computer
USB sound card
USB cable
Headphones
Sound card to headphone adaptor
Cable to connect sound level meter output to sound card input

**Introduction:**
The measure tests both ears and has six thresholds (1, 2, 4, 0.5, 6 & 8 KHz). The measure is scored using the pure tone average of the better ear (i.e., the ear with the lower threshold). In English, separate instructions are available for children (ages 6-7 years) and participants (ages 8-85 years); in Spanish, separate instructions are available for: children (ages 6-7 years), children (ages 8-17 years), and participants (ages 18-85 years).

The measure:

1. provides a valid, reliable, and rapid automated test of auditory sensitivity using pure tone signals to assess auditory sensitivity;

2. provides what audiologists refer to as an “air-conduction pure-tone audiogram” to assess the hearing sensitivity of each ear;

3. allows the examiner to classify the hearing of the participant as normal or as impaired (from mild to profound). The measure can also assess the configuration of hearing loss but is insufficient to determine the type or etiology of any hearing loss detected;

4. involves almost no instructions provided by the examiner; instead, once the headphones are placed on the participant by the examiner, the examiner initiates testing by launching the software. The participant receives...
automated instructions, followed by the test itself. Automated, interactive instructions involve recorded speech played via the headphones and corresponding text and/or images displayed on the monitor; and

5. involves presentation of a series of tones to the participant and requires the participant to respond to each presentation by indicating that they either heard or did not hear the tone. The presentation level of the test tone is varied up and down to determine the softest tone that the participant can hear. The test evaluates both ears and multiple tone frequencies (heard as tones of different pitch) for each ear. The test sequence begins by measuring hearing at one tone frequency in one ear. After 30 seconds or so, the test evaluates hearing at the same tone frequency but in the other ear. Next, the test switches to a different tone frequency and back to the first ear. Throughout the test, tones alternate between ears as hearing is evaluated at the different frequencies. The participant and examiner will be prompted when the test is completed.

**Equipment Set-up:**
The software drivers for the USB sound card should be installed prior to connecting the sound card to the computer. The USB sound card should then be connected to the computer. The headphones should be connected to the sound card using the headphone-sound card adaptor. The set-up and calibration are described in detail in the Training Manual entitled: *Soundcard and Headphone Set-up* found in the Introduction to the Computer section. These procedures must be accomplished before the computer can be used for participant testing.

![Correct settings on sound card](image)

**Participant Set-up:**
The participant should be seated at a table in front of the monitor, keyboard, and mouse. The equipment should be positioned such that the participant can easily and comfortably see the monitor and use the mouse for responding.
Like other toolbox measures, the participant-examiner positioning should support the examiner’s ability to see and hear the participant during testing and to allow the examiner to interact with the participant, if needed. During the test, the examiner should monitor the participant’s progress in the test.

The test includes logic to identify any possible lapses in attention or failure to follow the test instructions. The examiner should monitor warnings and other messages directed at the participant. During testing, the examiner may receive a prompt from the test software to assist the participant.

In the best case scenario, the examiner simply observes the participant responding to the test over the course of the test. In some cases, the examiner may have to assist the participant by asking for a verbal response to the test items and entering them for the participant. In the worst case scenario, the examiner may determine that the test is not appropriate for the participant and stop testing.

As with other measures, examiners should be aware of possible breakdowns in the administration and respond accordingly. The examiner should be aware that if the participant has a severe hearing loss that overlaps with one or more of the test sounds, he/she may not be able to hear any of those test sounds. As a result, he/she may not respond even though the sounds are presented at high levels. This is a normal event for some participants with hearing loss.
**Hearing Threshold Test Instructions**

**Say:** We are going to do an activity with whistles. For this activity, you get to wear these headphones. Once you put these on, you will hear a person who explains the activity. Your job is to listen carefully and to choose one of these two buttons when the voice asks you to. Let me show you how to choose the buttons. (Demonstrate button selection.) You will hear a voice (in the headphones) that will help you get started and show you how to do the exercise. I am going to put the headphones on you now and then we can get started.

Examiner should put the red headphone on the right ear and the blue headphone on the left ear. Adjust the headphone band to provide a comfortable fit. Because wearing the headphones mutes external sounds, while wearing headphones, some participants may not hear the examiner well or at all in the case of some hearing losses. If a participant reports that he/she cannot hear the examiner, remove the headphones when re-instructing the participant and then replace them when you are ready to begin again.

If the child has difficulty using the mouse, he/she may point and the examiner may operate the mouse and/or keyboard. The examiner should say something like the following: *You can point to your choice and then I will enter your choice.* Children with motor problems can respond by saying: Yes or No and the examiner can say: *You can say Yes if you heard a whistle and No if you did not hear a whistle.*

The graphics on the monitor are synchronized with recorded instructions.

**Screen 1:**

Statement: **Hello! We are going to do a whistle activity. First let’s see if you can hear me OK.**

Statement: **Choose the big ear, if you can hear me OK.**

Statement: **Choose the little ear, if I’m talking too softly. Choose the big ear or little ear now.**

- If the child fails to choose a button within five seconds, a question mark appears on the screen and a sound file prompts: **Choose the big or little ear now.**

- If the child chooses the little ear, the computer increases level by 20 dB. Testing software repeats the instruction to: **Choose the big ear if you can hear me OK.** (Up to three iterations.)

- If the child chooses the little ear after the second iteration, prompt the examiner to provide additional instructions as follows: The following text will appear on examiner screen.
Examiner should ask the child: **Could you hear and understand the person talking?**

If the child indicates yes, the examiner will state: **OK, be sure to choose the big ear if you hear the sound. Choose the big ear now.** Choosing the big ear will Exit the Loop.

If the child indicates no, the examiner will state: **OK, Let's see if you can hear me at a louder level. Choose the little ear now.** Choosing the little ear will allow the third iteration to be executed.

If the child chooses the little ear after third iteration, the examiner should restart the test using the verbal response mode based on the screen prompts.

**Screen 2:**

A sound file plays the statement: **Good listening. We want to see if you can hear different whistles like this one.**

The system plays a tone, in the right ear, at a comfortable level as determined by the screening.

A sound file plays the statement: **Some whistles will be easy to hear and some whistles will be hard to hear. Sometimes there will be no sound at all.** When it is time to listen for a whistle, you’ll see me with the headphones on.

**Screen 3:**

The software displays a rabbit.

A sound file plays the statement: **Here is a quiet rabbit. He is not making any sound at all.**

The software displays the bird picture with the rabbit picture.

A sound file plays the statement: **Here is a bird who makes whistle sounds.**

The software plays a tone in the right ear at comfortable level as determined by the screening.

A sound file plays the statement: **If you hear a whistle, choose the bird. If you don’t hear any whistle at all, choose the rabbit.**

**Screen 4:**

A sound file plays the statement: **Let's try one…**

The software plays a tone in the right ear at comfortable level based on the screening.

A sound file plays the statement: **Choose the bird if you heard a whistle. Choose the rabbit if you did not hear a whistle.**
If the child fails to choose a button within five seconds, a sound file prompts: Choose the bird if you heard a whistle.
Choose the rabbit if you didn’t hear a whistle.

If the child chooses the rabbit, a sound file says: OK, we’ll try another in a minute.
If the child chooses the bird, a sound file says: Great. Now we are ready to continue!

**Screen 5:**
The screen displays an arrow pointing to the right ear and a sound file says: Some whistles will be in this ear.

**Screen 6:**
The screen displays an arrow pointing to the left ear and a sound file says: Some whistles will be in the other ear. Choose the bird if you hear a whistle in either ear. Choose the rabbit if you do not hear a whistle.

**Screen 7:**
A sound file states: Let's practice again. Listen carefully for a whistle.
The screen displays the headphone icon. The software plays a tone in the right ear at level determined by the screening.

If the child fails to choose a button within five seconds, a sound file prompts: Choose the bird if you heard a whistle.
Choose the rabbit if you did not hear a whistle.

If the child chooses the rabbit, a sound file says: Oops. That time the bird whistled and you chose the rabbit. Let’s try that again.
The software will re-present the tone at a slightly higher decibel level and the child will repeat the exercise up to three times or until successful. If the child chooses the rabbit on the third iteration, the examiner will be prompted to verbally instruct the child to respond by choosing the bird or the rabbit.

If the child chooses the rabbit on third iteration after verbal instructions by the examiner, the examiner should chose the onscreen buttons for the child, based on the child’s verbal response.

If the child presses the bird, a sound file says: Great. Let's try some more!

**Screen 8:**
The screen displays the headphone icon but no tone is played. This is a ‘catch trial’ incorporated into the system to inhibit cheating.
If the child fails to choose a button within five seconds, a sound file prompts: **Press the bird if you heard a whistle**. **Press the rabbit if you did not hear a whistle.**

If the child chooses the bird, a sound file says: **Oops. hat time it was quiet and you chose the bird. Remember: listen carefully. Press the bird if you hear a whistle. Choose the rabbit if it is quiet.**

The software repeats the presentation with no sound.

If the child presses the bird button on the second iteration, the examiner will be prompted to verbally instruct the child to respond by choosing the bird or the rabbit.

If the child chooses the rabbit, a sound file says: **Great! Now let’s get started with the whistle activity.**

**Note:** The term Press or Choose is used throughout as a generic term prompting a manual response via mouse click. If the examiner is responding for the child, the term Say can be used for verbal responses or Point for manual responses.

The hearing assessment runs automatically.
Hearing Threshold Test Instructions

Say: Now I will ask you to wear these headphones. If you are wearing hearing aids, I will ask you to remove them for the hearing test. Once the headphones are on, we will begin testing your hearing. I will ask you to choose your response with the mouse. The computer will give you the instructions. I will put the headphones on you now and we can get started with the instructions.

Examiner should put the red headphone on the right ear and the blue headphone on the left ear. Adjust the headphone band to provide a comfortable fit. Because wearing the headphones muffles external sounds, while wearing headphones, some participants may not hear the examiner well or at all in the case of some hearing losses. If a participant reports that he/she cannot hear the examiner, remove the headphones when re-instructing the participant and then replace them when you are ready to begin again.

It is expected that the participant will use the mouse to indicate his or her responses. If a participant has difficulty using the mouse or keyboard, he/she may point and the examiner may choose the response. The examiner should say something like the following to the participant: You can point to your choice and then I will enter your choice. For participants with motor difficulties, verbal response mode will be used in which the participant can say Yes when a tone is heard, and No when a tone is not heard.

Written instructions will appear on the monitor and will be synchronized with recorded instructions.

Screen 1:

A sound file says: Welcome to the hearing assessment.
The sound file continues: Choose LOUDER if this sound is too soft. Choose OK if this is loud enough.
If the participant presses OK, the next screen is presented.
If the participant presses LOUDER, the software will increase the sound level and the instructions will be repeated.
If response is LOUDER after the second iteration, the examiner should ask the participant: Could you hear and understand the person talking?
If the participant indicates yes, the examiner should say: OK, as we go forward, be sure to choose OK if you hear the sound. Choose OK now.
If the participant indicates no, the examiner should say: **OK, let's see if you can hear it at a louder level. Choose LOUDER now.** A LOUDER response will allow the third iteration to be executed.

If the participant chooses LOUDER after the third iteration, the examiner should instruct the participant to respond verbally and operate the response buttons on their behalf.

**Screen 2:**

A sound file states: **Good. Let’s review the instructions.** When you see and hear the LISTEN NOW prompt, listen carefully. You may hear a beep like this one.

The screen displays a visual and auditory Listen Now prompt and the software plays a 1000 Hz tone.

A sound file states: **Some beeps will be very soft.** After the Listen Now prompt, choose YES if you hear a beep. Choose NO if you do not hear a beep.

**Screen 3:**

A sound file states: **Let’s practice one now.**

The LISTEN NOW prompt appears and a 1000 Hz tone is played in the right ear.

The screen displays the message: Did you hear a beep?

*If response = NO, a sound file states: You responded NO when a tone was presented. Let’s try again.*

The software increases the tone level 10 dB and the practice is repeated.

*If response = NO after the second iteration, the examiner should verbally repeat the instructions for responding.*

*If response = YES, a sound file states: Great. Now we are ready to continue.*

**Screen 4:**

A sound file states: **The beep can be in either ear.** Sometimes there won’t be any beep at all. If you choose YES and no beep was played, you will get a warning message like this:

The screen shows the warning prompt and plays the message: You chose YES when no beep was played. Listen Carefully. Choose YES only when you hear a beep. Did you understand the instructions? Choose YES or NO.

*If YES, a sound file states: Good. Let’s get started with the hearing assessment.*

*If NO, a sound file states: OK, let’s go through it again. The instructions are repeated.*
If response = NO after 2 iterations, the examiner should follow the instructions with the participant and ask if clarification is needed at each step. The examiner may choose to ask the participant to verbally respond and operate the response buttons on their behalf.

Note: The term Press or Choose is used throughout as a generic term prompting a manual response via mouse click. If the examiner is responding for the child, the term Say can be used for verbal responses or Point for manual responses.

The hearing assessment runs automatically.
Words-in-Noise

Materials
Monitor
Keyboard
Mouse
Laptop computer
USB sound card
USB cable
Headphones
Sound card to headphone adaptor

Note: If this test is not administered after the Hearing Threshold Test, the examiner must follow the set-up procedures for sound card (but not the headphone calibration routine) described in the Training Manual entitled: Soundcard and Headphone Set-up found in the Introduction to the Computer section. The software drivers for the USB sound card must be installed prior to connecting the sound card to the computer.

Description:
This measure quantifies a participant’s ability to hear words in a noisy environment. A female speaker instructs the participant to say a one-syllable (in English) or two-syllable (in Spanish) word while in the background there is the noise of multiple people speaking at the same time. At the beginning of the test, the speaker’s voice is much louder than the background noise; as the test progresses, the speaker’s voice gradually becomes softer and eventually is the same level as the background noise.
There are seven levels of word/noise ratios and five words at each level. Each ear is tested separately and the test is concluded when a participant cannot repeat all five words at a given level for a given ear.

Each screen represents a noise level and on each, the examiner clicks the word(s) that the participant correctly identifies. If all five words at a given level are incorrect, the computer will stop playing the audio files and the examiner’s screen will show: Ear 1 testing is completed. If the participant repeats some words from each of the seven levels, then when all the audio files are presented, the examiner’s screen will show: Ear 1 testing is completed. The test automatically switches to the second ear, and the examiner says to the participant: Now, we are going on to the other ear and clicks on the BEGIN TESTING EAR 2 button.

As before, a series of five words will appear on the examiner’s screen and the associated audio files will play in the participant’s earphones. If all five words at a given level are incorrect, the computer will stop playing the audio files and the examiner’s screen will show: Ear 2 testing is completed. If the participant repeats some words from each of the seven levels, then when all the audio files are presented, the examiner’s screen will show: Ear 2 testing is completed.

The computer will automatically score the participant’s performance.

Before placing the headphones on the participant’s head, the examiner should make sure that he/she can see the participant’s face and hear his/her responses; at the same time, the participant should not be able to read the examiner’s screen.

Note: If a participant wears hearing aids, they should be removed for the duration of this test.
Words-in-Noise Instructions

**Note**: If a participant wears hearing aids, they should be removed for the duration of this test.

Before placing the headphones on the participant’s head, the examiner should make sure that he/she can see the participant’s face and hear his/her responses; at the same time, the participant should not be able to read the examiner’s screen. The examiner should introduce the task, saying: You will hear a woman asking you to repeat various words. Repeat the words she asks out loud so that I can hear you. For example, if you hear her say, ‘Say the word dog,’ you would say, ‘dog.’ If you are not sure what she said, just say what you think you heard. You will also hear people talking in the background. Do your best to ignore them and to focus on the woman’s voice asking you to repeat the words. Do you have any questions? Answer any questions and say: Let’s begin.

The examiner should place the earphones on the participant’s head, making sure that the right earphone is over the right ear and the left earphone is over the left ear, then click on the **BEGIN TESTING EAR 1** button.

A series of five words will appear on the examiner’s screen and the associated audio files will play in the participant’s earphones. The examiner should listen carefully to the participant’s responses and click next to the word that is said correctly. Incorrect words are not marked. If all five words at a given level are incorrect, the computer will stop playing the audio files and the examiner’s screen will show: **Ear 1 testing is completed**. If the participant repeats some words from each of the seven levels, when all the audio files are presented, the examiner’s screen will show: **Ear 1 testing is completed**.

Then the examiner should say to the participant: **Now, we are going on to the other ear.** Click the **BEGIN TESTING EAR 2** button. As before, a series of five words will appear on the examiner’s screen and the associated audio files will play in the participant’s earphones. Again, the examiner should listen carefully to the participant’s responses and click next to the word that is said correctly. Incorrect words are not marked. If all five words at a given level are incorrect, the computer will stop playing the audio files and the examiner’s screen will show: **Ear 2 testing is completed**. If the participant repeats some words from each of the seven levels, when all the audio files are presented, the examiner’s screen will show: **Ear 2 testing is completed**.

The computer will automatically score the participant’s performance.
Regional Taste Intensity Test

**Materials:**
Laptop and mouse  
Monitor and keyboard  
Laminated pictures of procedure  
Gloves (latex free)  
2 sterile cotton swabs  
Bottle of purified water at room temperature (e.g., Aquafina™ or Dasani™)  
Disposable cup for each participant  
Cup, basin, or sink for spitting solutions and rinse water  
Quinine solution in small cups  
Salt solution (NaCl) in small cups

**Description:**
This activity assesses a participant’s sensitivity to bitter and salty solutions in the mouth generally, as well as specifically on the tip of the tongue. The participant’s responses are recorded on the computer screen using a calibrated scale that ranges from **No sensation** to **Strongest sensation of any kind**.

Initially the participant is taught to use the scale and then asked to rate the solutions as they are presented in different areas of the mouth using the same scale.

In English, one set of instructions is given; in Spanish, two sets of instructions are available: one for 12-17 year olds and another for 18-85 year olds.
Regional Taste Intensity Test Instructions

Say: Now I am going to test your sense of taste. To do this, we will be using a salty flavor and a flavor found in tonic water.

Demonstration instructions for learning to use the scale:

Say: Before the tasting, I am going to ask you to use this scale to rate how weak or strong some sensations are to you. Some of these sensations are things that you will experience. Some of these sensations are what you will recall experiencing in the past.

Continue: This scale ranges from ‘no sensation’ at the bottom to the ‘strongest sensation of any kind’ at the top. The top of the scale (Strongest Sensation of Any Kind) refers to any kind of experience, for example sound, brightness of light, even those sensations that might be painful. Point to the scale on the screen and use one finger to indicate the bottom to the top, saying, This is how you use this scale. Demonstrate how the participant can use the mouse pointer on the scale.

How to use this scale:

- Choose a word on the scale that describes what you experience or what you remember.
- Make a mark anywhere on the line by clicking on it. For example, if the sensation you experience is more than "moderate" but not quite "strong," use the mouse to mark on the line between moderate and strong.
- Move the mark until you think it best represents how you feel. You can do this by dragging the arrow.
- When you are happy with the position of the mark press the OK button.
- The top of the scale, "strongest sensation of any kind," refers to any kind of experience (for example sound, brightness of light), even those sensations that might be painful.
Continue the demonstration by showing the scale and saying: You can use the mouse pointer to choose a word on the scale that describes what you experience or what you remember. You can click anywhere on the line. For example, if the sensation you experience is more than 'moderate' but not quite 'strong', you can use the mouse pointer to mark a spot between moderate and strong. Demonstrate for the participant.

Then say: Move the mouse pointer until you think it best represents how you feel, and then click on that spot on the scale. If you like, you can fine-tune your rating by using the up and down arrows on the computer keyboard. When you are happy with the position of the mark, click on the OK button.

Once the participant has clicked the OK button say: Let's try some examples. The scale on the screen will no longer have instructions on it.

Practice Trial 1:
Say: Use this scale to rate the brightness of a well-lit room. How strong or intense is the brightness to you? When you are finished, click on the OK button.

Practice Trial 2:
Say: Please remember the brightness of a dimly lit restaurant, where the only light is from candles on the table. Would you say the intensity of a dimly lit restaurant is less bright or brighter than the light in a well-lit room? Use the scale to rate the brightness of a dimly lit restaurant. When you are finished, click on the OK button.

Practice Trial 3:
Say: Now think about the brightest light you have ever seen. Use the scale to rate the intensity or strength of the brightest light you have ever seen. When you are finished, click on the OK button.

If a participant has difficulty using the mouse, he/she may point and the examiner may operate the mouse. The examiner should say something like the following to the participant: You can point to your choice and then I will use the mouse and keyboard to choose for you.
Test Items:
There are four trials: quinine on the tongue tip, salt on the tongue tip, quinine in the whole mouth, and salt in the whole mouth. The examiner should follow the prescribed order.

Say: Before we begin, please rinse out your mouth two times with the bottled water and then spit the rinse water into this container.

Continue: Now, I am going to ask you to rate the strength of these tastes. First, I will put some of the solution across the tip of your tongue and ask for a rating. To begin, I will put on these gloves.

Step 1: The examiner should put on gloves for the remainder of this measure.
Step 2: Put the swabs into the cups of solution and say: Then, I will put this sterile cotton swab into the solution.

Continue: Now hold your tongue out. If the participant has difficulty doing this, show him/her the picture or demonstrate. Starting with Test Item 1, say: Then, I am going to start on your left side and gently put some solution across the tip of your tongue. The examiner should carefully and gently apply the solution in a slow, continuous motion from the left side of the tongue across the tip and finishing on the right side of the tongue.
Test Item 1:
Using the cotton swab, paint the quinine on the tip of the tongue as described earlier, and say: **Now, show me the strength or intensity of the taste on the scale you used before. Keep your tongue out while you make the rating on the scale. Click the OK button when you are finished. If you should accidentally swallow any, it will not hurt you.**

Have the participant rinse out his/her mouth with the bottled water between Items 1 and 2, saying: **Please rinse out your mouth two times with the bottled water and spit the rinse water into this container.**

Test Item 2:
Using the cotton swab, paint the salt solution (NaCl) on the tip of the tongue as described earlier, and say: **Now, show me the strength or intensity of the taste on the scale you used before. Keep your tongue out while you make the rating on the scale. Click the OK button when you are finished. If you should accidentally swallow any, it will not hurt you.**

Have the participant rinse out his/her mouth with the bottled water between Items 2 and 3, saying: **Please rinse out your mouth two times with the bottled water and spit the rinse water into this container.**

Test Item 3:
Hand the participant a small cup with quinine and say: **Next, I would like you to sip all the solution in this cup. Try not to drink the solution, but hold it and gently move it around in your mouth until I tell you to spit it out in this container. If you should accidentally swallow any, it will not hurt you.**
After the participant sips the solution, the examiner should count for three seconds (one-thousand-one, one-thousand-two, one-thousand-three), and then say: Spit out the solution in your mouth and swallow whatever remains. Then, rate the strength or intensity of the taste on the same scale you used before. Click the OK button when you are finished.

Have the participant rinse out his/her mouth with the bottled water between Items 3 and 4, saying: Please rinse out your mouth two times with the bottled water and spit the rinse water into this container.

Test Item 4:
Hand the participant a small cup with salt solution (NaCl) and say: Next, I would like you to sip all the solution in this cup. Try not to drink the solution, but hold it and gently move it around in your mouth until I tell you to spit it out in this container. If you should accidentally swallow any, it will not hurt you.

After counting one-thousand-one, one-thousand-two, one-thousand-three once the participant has sipped the solution, the examiner should say: Spit out the solution in your mouth and swallow whatever remains. Then, rate the strength or intensity of the taste on the same scale you used before. Click the OK button when you are finished.

After the last item is administered, give the participant the bottle of water and encourage him/her to drink it and/or rinse some more. The examiner should say: Now that we have finished, you might want to drink some more water to clean out your mouth.

The participant may be offered a candy to help overcome any remaining taste in his/her mouth. (Sugar-free candy may be needed for diabetic participants.)
Pictures for Regional Taste Test

Step 1: Put on gloves. Step 2: Open the tasting solutions and put in cotton swabs. Step 3: Tongue out.

Step 4: Move from left to middle to right side.

Step 5: Say: Keep your tongue out while you make the rating on the scale.
Salt and Quinine Solution Mixing Instructions

Equipment and Supplies:

An electronic balance (scale) readable to at least 0.01 grams, and preferably 0.001 grams
Examples: Ohaus Aventurer Pro Series or Denver Instrument Summit Series prices run around $1000+

Magnetic stirrer
Example: Fisher Scientific Isotemp Basic Magnetic Stirrer 7 x 7 in, 120 volt price is $295

Stir bar (1 or 1.5 inches in length)
Example: Fisher Scientific Stir Bars 9.5 dia X 25.4 mm L price $7.79

Plastic-coated magnetic retrieving rod
Example: Fisher Brand Stir Bar Retriever, 12 inch price $16.27 each

A 1-liter graduated cylinder
Example: Fisherbrand Serialized Class A Graduated Cylinder price $169.42 each. A more affordable Polypropylene graduated cylinder is an option if cost is prohibitive.

Solution storage bottles, light-occluding are required for quinine
Example: Pyrex Brown Solution Storage Bottles price for case of four 500 ml bottles is $173.65

A lab spoon
Example: Fisherbrand Lab Spoon price $13.93 each

Plastic weigh boats
Example: Anti-Static Weighing Boats price for small (needed for quinine) $39 for 500, price for large (needed for NaCl) $83.50 for 500

Food, Kosher or USP grade Quinine monohydrochloride dihydrate.
Example: Aldrich Quinine monohydrochloride dihydrate price: $58 for 100 grams.

USP grade NaCl
Example: Spectrum Sodium Chloride Granular, USP price: $174.70 per 2.5 kg. Can also be ordered in bulk.
Distilled or deionized water
Example: Earth2O Distilled Water available in grocery stores, prices vary by location

Note: NIH Toolbox norms were collected using USP grade NaCl (formula weight 58.44) available from Spectrum Chemicals and Kosher grade quinine monohydrochloride dihydrate (formula weight 396.9) available from Sigma-Aldrich.

Directions

Make sure that balance is on a level surface. Add weigh boat to balance pan, and carefully zero the balance. Then add 58.44 grams of NaCl to the weigh boat. To mix the 1 Molar NaCl solution, you will need to add the NaCl to 1 liter of purified water. To do this, place pre-measured NaCl crystals in a 1-liter graduated cylinder. Make sure all the crystals are emptied from the weigh boat into the graduated cylinder. Slowly add distilled or deionized water to the 1-liter mark by bringing the meniscus (bottom) of the solution to the 1000 ml mark. Gently add the stir bar and then stir on a magnetic stirrer until the NaCl is completely dissolved (approximately 5 to 10 minutes). Once NaCl is fully dissolved, turn off the stirrer, and use the retrieving rod to remove the stir bar from the solution. Transfer the solution to labeled storage bottles. Wash and rinse graduated cylinder, stir bar, and retrieving rod thoroughly before reusing.

To mix 0.001 M quinine hydrochloride dihydrate, dissolve 0.397 grams quinine in purified water. To do this, weigh out 0.397 grams of quinine HCl dihydrate as described above. If you do not have access to an analytical balance that goes to four decimal points, weigh out 0.40 grams of quinine HCl on a standard top-loading electronic balance. Do not use a triple-beam balance for quinine. Place the pre-measured quinine in a 1-liter cylinder, add distilled or deionized water to the 1000 milliliter mark, gently add the stir bar and then stir on a magnetic stirrer until the quinine is completely dissolved, and no visible crystals can be seen (at least 15 to 20 minutes). Transfer the solution to labeled storage bottles. When finished, wash and rinse graduated cylinder, stir bar, and retrieving rod thoroughly before reusing.

Solution Storage Requirements:

Taste solutions should be made fresh each week, stored under refrigeration when not in use, and should be warmed to room temperature prior to use for testing. Please do not freeze the solutions because the container may crack (Note: 3-4 hours is generally required for solutions to warm to room temperature.)

Taste solutions should be stored in glass bottles with a non-reactive lid. Quinine is light sensitive, so quinine should be stored in a light-occluding glass bottle or a bottle wrapped in aluminum foil to minimize light exposure.

Use of Solutions for Taste Testing:
Each participant will be tested with 10 ml of quinine solution and 10 ml of NaCl solution. Solutions should be at room temperature for testing. Two labeled medicine cups should be used to hold the solutions for testing each participant. 10 ml of quinine solution should be poured into one cup and 10 ml of NaCl solution should be poured into the second cup. For tongue tip testing, a clean cotton swab will be dipped once in the quinine solution and then used to paint the solution across the anterior tongue. After the participant rinses his/her mouth, a second clean cotton swab will be dipped once in the NaCl solution and used to paint the solution across the anterior tongue. The solution remaining in each of the two cups will then be used for whole-mouth testing, first with quinine and then with NaCl. See test instructions for detailed information on administering the test.
Hearing Handicap Inventory for Adults & Elderly - Screening Version

**Equipment:**
Computer  
Monitor  
Mouse or keyboard

**Description**
This set of questions asks the participant to self-report any difficulties with hearing or hearing-related activities. Each participant will answer ten questions. Two of the questions differ for participants ages 18-64 (HHIA-S) and those ages 65-85 (HHIE-S) years of age.

The questions are introduced by the following text on the computer screen:

*The purpose of this questionnaire is to identify any problems your hearing may cause you. Click “No”, “Sometimes”, or “Yes” to answer each question. Do not skip a question if you avoid a situation because of a hearing problem. If you currently use hearing aids, please answer as if you were WITHOUT your hearing aids.*

*After you make your choice, the computer will automatically go to the next question. If you want to change your answer, click on the GO BACK button to return to the question, then choose a different answer.*

*Click the NEXT button when you are ready to begin.*

**Note:** If a participant has difficulty using the mouse, he/she may point and the examiner can operate the mouse.
Vision Health-Related Quality of Life Survey

Equipment:
Computer
Monitor
Mouse or keyboard

Description
This self-administered questionnaire asks adult participants to respond to 53 items about their vision (aspects such as color vision; specific problems such as blurriness or headaches; under different conditions such as fluorescent lighting or nighttime; while doing different activities). All questions are answered on 5- or 4-point scales: Not difficult at all; A little bit difficult; Somewhat difficult; Very difficult; Unable to do because ...; or No problem at all; A little bit of a problem; Somewhat of a problem; Very much of a problem.

The items generate scores on six separate subscales: Color Vision; Distance Vision; Near Vision; Ocular Symptoms; Psychosocial; and Role Performance.

The instructions to the participants on the screen read:

On the next screens, we will ask you questions about how your vision affects your life. Answer the questions thinking of your vision as it is when corrected by any glasses or contact lenses that you usually use. Read each question carefully and answer as well as you can. After you make your choice, the computer will automatically go on to the next question. If you want to change your answer, click on the GO BACK button to return to the previous question and then choose a different answer.