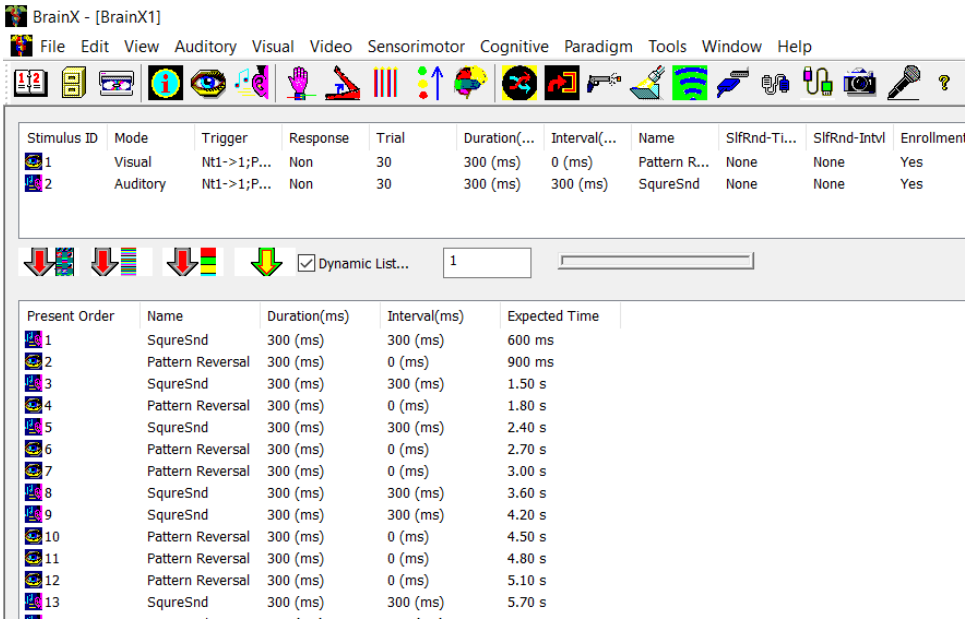
BrainX

Main Frame Guide (*Stimuli and Presentation Item*)



DISCLAIMER

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Features and specifications of this software program are subject to change without notice. This manual contains information and images about BrainX, its user interface, GUI and its other signal processing algorithms, publications that are protected by copyright.

Sending Your Comments and Critiques: We'd like to hear from you. Your comments and suggestions for improving this document are welcome and appreciated. Please e-mail your feedback to BrainX@live.com

Thank you.

Contents

Warnings and Cautions

This software can be used to design paradigms for magnetoencephalography (MEG), electroencephalography (EEG) and functional resonance imaging (fMRI).

The following warnings and cautions appear in this guide. Please ensure you are aware of all the operations and interpretations.

Preface

The Main Frame is one of the core windows of BrainX software. It is used as the primary tool to view the stimuli and presentation orders. Importantly, the Main Frame provides graphic user interface (GUI) for access other function. In other words, it is also often used to launch other windows such as adding pictures.

This guide describes the operation of the BrainX application for designing auditory, visual, somatosensory, and motor paradigms. Paradigms for high-frequency functions can be designed with the parallel, link and response modules. Since the response module can link to another parallel/link/response module, BrainX enable researchers/clinicians to design very sophisticated paradigms.

Determining the Software Version

In the Main Frame: select Help -> About.

The About Dialog will show the version of the software.

Intended Audience

This guide is intended for anyone needing to view or design stimuli, paradigms, questionnaire and response tasks using a computer. It assumes the reader is familiar with functional brain test procedures and with the Windows operating systems.

Document Structure

Documents are generally provided in both Microsoft Word® format and Adobe® Acrobat® PDF (Portable Document Format). All editions are distributed on Flash Driver, CD or websites with the related software, and include bookmarks and hyperlinks to assist navigating the document. Please feel free to send your critiques, corrections, suggestions and comments to BrainX@live.com.

Conventions

Numeric: Numeric values are generally presented in decimal but in special circumstances may also be expressed in hexadecimal or binary. Hexadecimal values are shown with a prefix of 0x, in the form 0x3D. Binary values are shown with a prefix of 0b, in the form 0b00111101. Otherwise, values are presumed decimal.

Units: Units of measure are given in metric. Where measure is provided in imperial units, they are typically shown in parenthesis after the metric units. Time is measured in milliseconds (ms) or microsecond.

Using BrainX Main Frame

The stimulation viewer in the middle of main frame is used to review and edit previously designed stimuli. Those stimuli can auditory, visual, somatosensory, motor and high-brain functional paradigms.

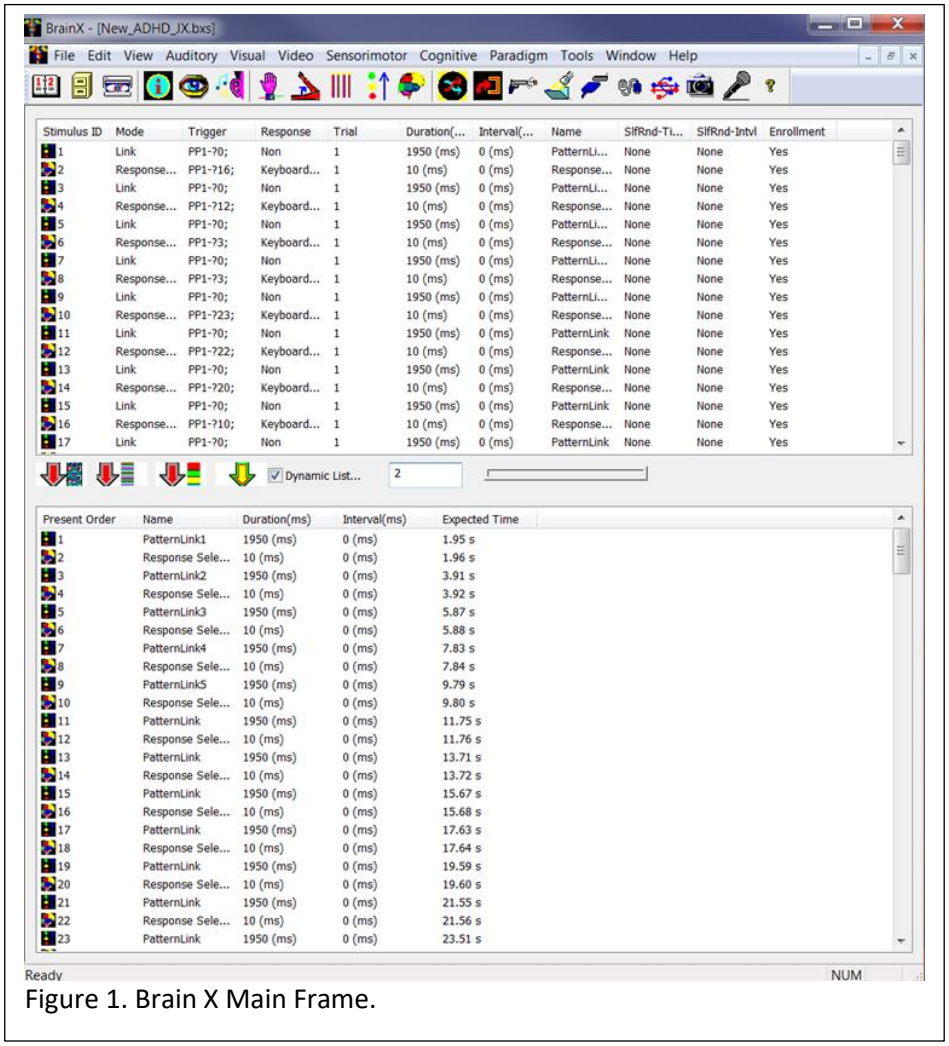


Figure 1. Brain X Main Frame.

High-brain functional paradigms can be divided into at least three groups:

Pattern Parallel: two or more stimuli can be presented simultanously. For example, auditory and visual stimuli can be presented at the same time.

Pattern Link: two or more stimuli can be presented sequentially. For example, auditory and visual stimuli can be presented one-by-one.

Pattern Response: one or more stimuli can be presented according to the responses from the subjects. For example, a warning sound can be played when subject presses a wrong button when the screen showing a piture.

All the aforementioned stimuli can be intermiggled, randomized or manually arranged to a paradigm.

BrainX Graphic User Interface (GUI)

You can start the application in any of these ways:

1, Double-click the application icon in the Program group;

2, Double-click the short cut icon on the desktop;

When the software running, the BrainX GUI (environment will appear). BrainX remembers the window position.

Environment Variables

Though BrainX can read/import many file formats, BrainX has its own file format. When a file is imported at the first time, you may need to decide where to store the imported file to BrainX. To be safe, please do not over-write the original file.

Launching BrainX

Similar to many other software programs on Windows, BrainX can be launched by simply clicking "BrainX.exe" file or any short-cuts linked to it.

Reading picture/image and sound data

There are several ways to read data:

(1) drag-and-drop: you may drag-and-drop a image or sound file on the BrainX program; it will automatically import the data as one or more stimuli.

(2) Open/Import File Dialog: Click the open file button (see below) or select the File->Open:

Readable Files

BrainX can read many image (e.g. *.bmp; *.jpg; *.tif) and sound (e.g. *.wav; *.aif; *.aiff) files. Understandably, the number of readable files is increasing (e.g. we can support some special file format if users request it).

Design Panel and Presentation Panel

In the Main Frame, there are two major panels: the Design Panel and the Presentation Panel. The Design Panel is the panel used to setup and design the stimuli (e.g. image size, time, and trigger). The Presentation Panel is the panel used to setup and arrange the presentation of the stimuli.

Noticeably, the Presentation Panel does not have true stimuli; it only has the pointers to the stimuli. Therefore, the role of the Presentation Panel is to arrange the stimulation for presentation. In other words, it takes care how the stimuli to be presented (when, how many repetition).

Customizing the Layout

The BrainX provides templates for each type of stimulus, or module, so that the stimuli/presentation can be precisely designed. To ensure the display consistently and appropriately, these display settings are stored in the file. When the designed paradigm is opened, BrainX uses the settings in this file to determine the display settings to use. You can change any of the display settings, and your changes can be saved to the file. The next time you load the dataset, the new settings will be restored.

Stimulus List

This section describes how to select the channels to display in the strip chart.

In the top panel of the Main Frame, all the stimuli are listed. Each stimulus in the list has the following information:

Stimulus ID: this is the ID number in the list. Users can re-arrange the order whenever it is necessary.

Mode: this is the mode of the stimulus, such as visual, auditory, somatosensory, motor, pattern parallel, pattern link, pattern response.

Trigger: This is the key for MEG/EEG study, which typically requires high time resolution (no or less jittering). The column shows the computer port(s) that the trigger will be sent. In addition, the trigger values or the pulse will also be showed here.

Response: this shows if the stimulus will be waiting for any responses. If the stimulus is designed to wait for response, the information about the anticipated response will be display here.

Trial: the number of trials will be used in the final paradigm. Notably, the number of final presentation of the stimulus is different from the number of trials because users may manually add or remove trials in the presentation order.

Duration (ms): The duration allocated for the presentation of the stimulus. For visual stimulus, the duration is typically equal to the time of the presentation of the picture/image. For

other stimulus, the duration is typically equal or larger/longer than the time of the presentation or stimulation. The duration should be larger zero. Otherwise, it does not make anything.

One of the features of BrainX is that, the duration can be self-controlled and randomized for each individual stimulus.

Interval (ms): Interval is the time between the end of the current stimulus and the beginning of the next stimulus. The interval can be zero.

One of the features of BrainX is that, the interval can be randomized among all the stimuli in the list. In addition, the interval can be self-controlled and randomized for each individual stimulus.

Name: the name of the stimulus. It is a good idea to use a unique name so that users who do not participated in the design of the paradigm can also understand the stimulus (e.g. picture-face-smile; sound-tone-bilateral; finger-tapping-left).

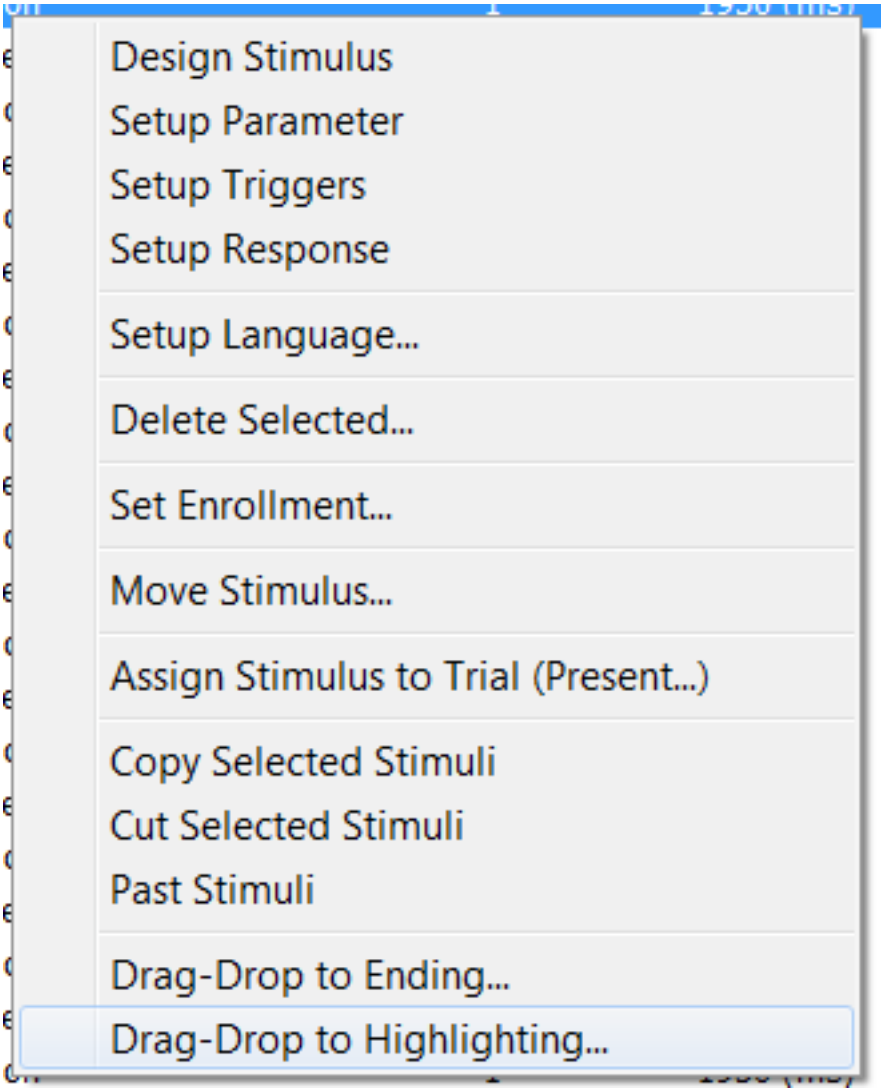
SlfRnd-Time: it means Self-random Time. If this function is enabled; the time of presentation will be randomized in run-time/real-time. Of note, the duration can be self-controlled and randomized for each individual stimulus.

SlfRnd-Intvl: it means Self-random interval. If this function is enabled; the time of the interval will be randomized in run-time/real-time. Of note, the interval can be self-controlled and randomized for each individual stimulus.

Enrollment: the Enrollment indicates if the stimulus will be used to generate the stimulation paradigm. If the Enrollment is enabled (“Yes”), then the stimulus will be used to generate the stimulus paradigm. If the Enrollment is disabled (“No”), the stimulus will be excluded from the stimulus paradigm.

Popup Menu in the Design Panel (Press the right mouse button)

BrainX provides a set of function to edit the stimuli (see Figure 3). Users can press the right mouse button to elicit the Popup Menu.



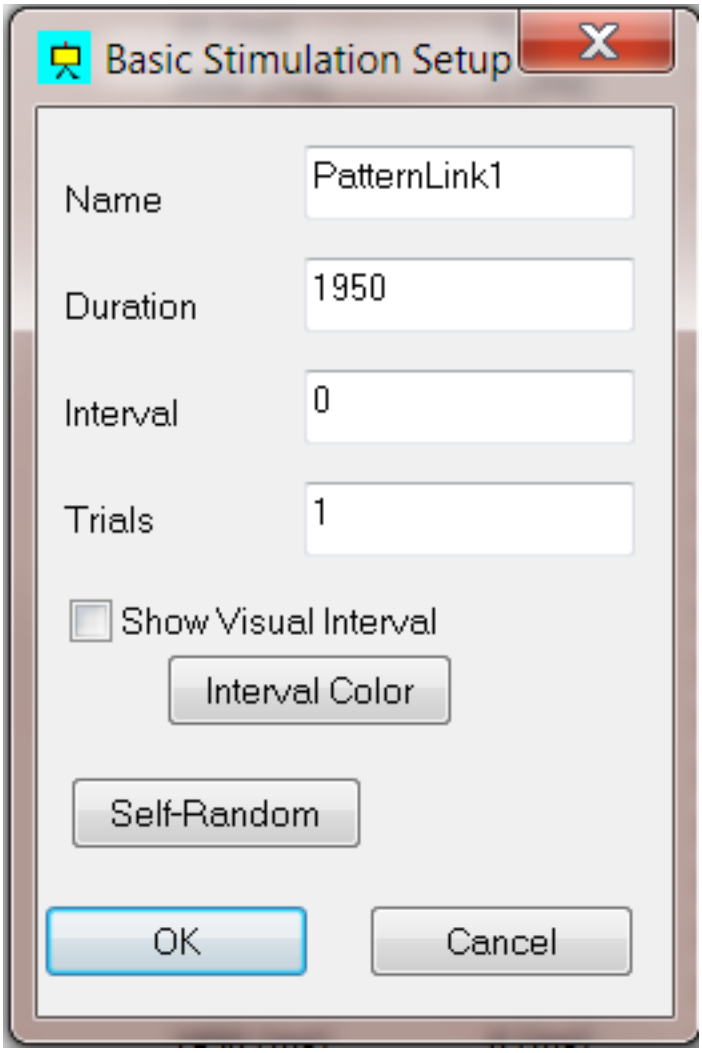
Design Stimulus

BrainX allows double-click the Left-Mouse Button to show the window for editing or changing the stimulus.

In addition, pressing the Right-Mouse Button and Select the “Design Stimulus” Menu can also show the window for editing or changing the stimulus.

Setup Parameter

By selecting the “Setup Parameter” Menu in the Popup Menu, users can change the basic parameters (see the Following Figure).

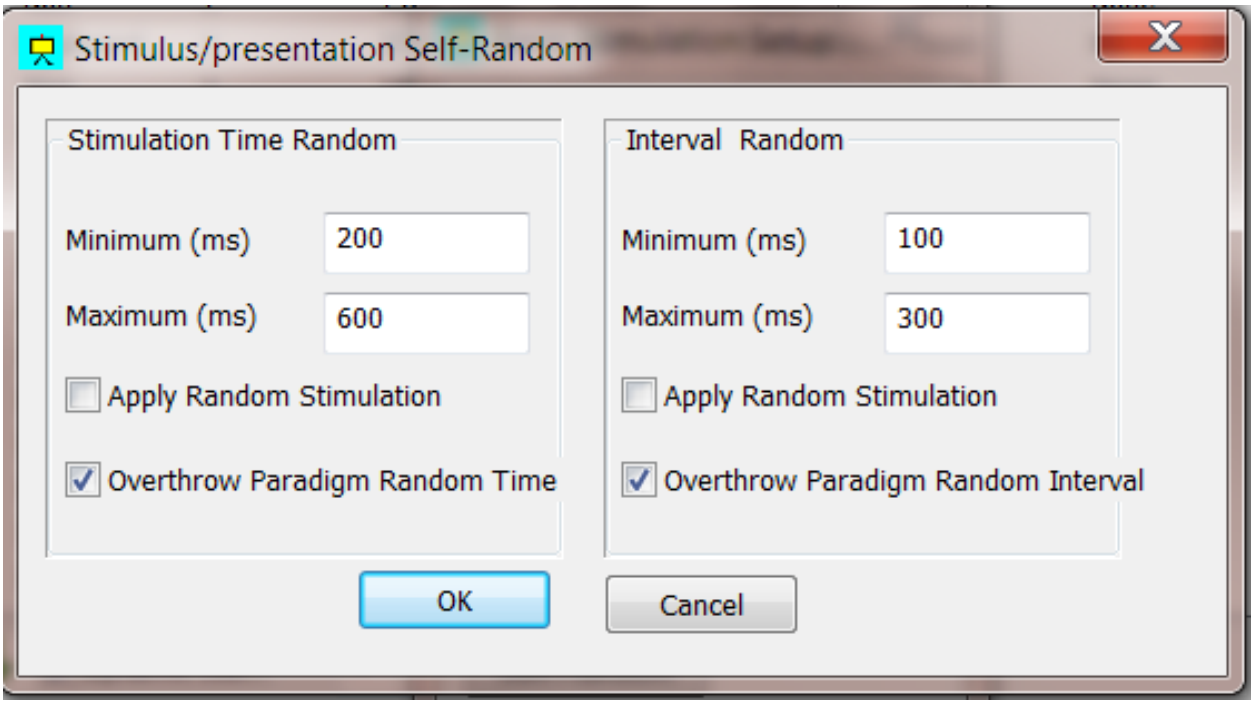


The basic parameters include the Name, duration, interval and trials. Please note that a color background can be displayed during interval. This is typically necessary for visual stimulation, but it is also can be used in the Pattern Parallel, Pattern Link and Pattern Response.

The Self-Random enables users to define randomized presentation time and interval for each individual stimulus.

Self-Randomization

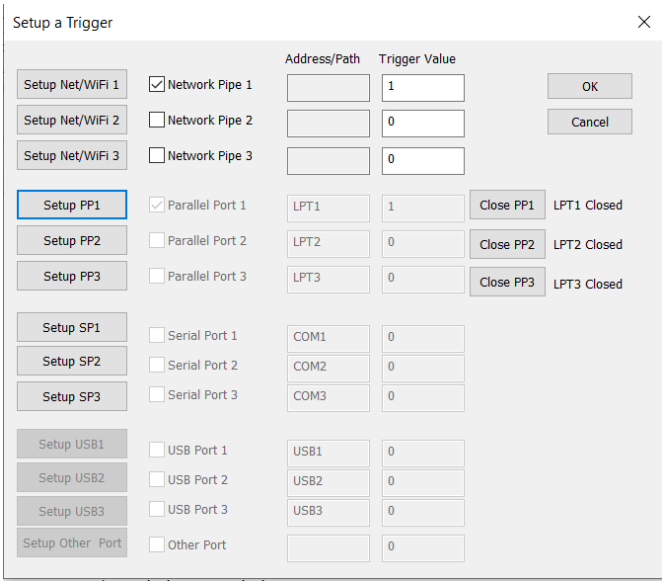
The Self-Random enables users to define randomized presentation time and interval for each individual stimulus. **Please note that, if the interval is generally randomized with all trials, the "Self-Random" function can be used to set an individual stimulus with a consistent interval by setting the "Minimum" and the "Maximum" of randomization to a same value.**



Setup Triggers

Each stimulus can send trigger values (e.g. 1, 2, 3) to one or more network pipes and computer ports (e.g. parallel port, serial port and USB port).

One of the powerful features is that it supports multiple-ports for each individual stimulus. In other words, a presentation can trigger more than one devices or systems. In addition, BrainX enables user to send pulse to parallel port pins.

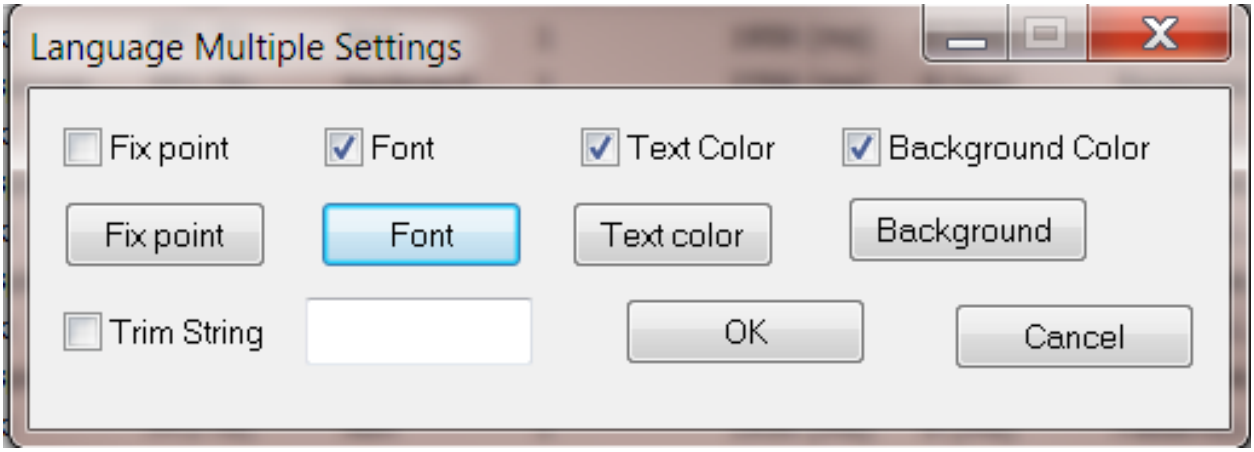


Setup Response

BrainX supports the setup of responses for multiple stimuli at once. By selecting the stimuli, responses from the subjects can be processed or recorded.

Setup Language

The parameters in language stimuli can be setup individually. To enable efficient design paradigms, BrainX provide a window/dialog for users to setup basic parameters for selected language stimuli at once (see the following figure).



Delete Selected

This function deletes the selected stimuli.

Set Enrollment

This function sets the selected stimuli to be enrolled for generating paradigm or to be excluded for generating paradigm.

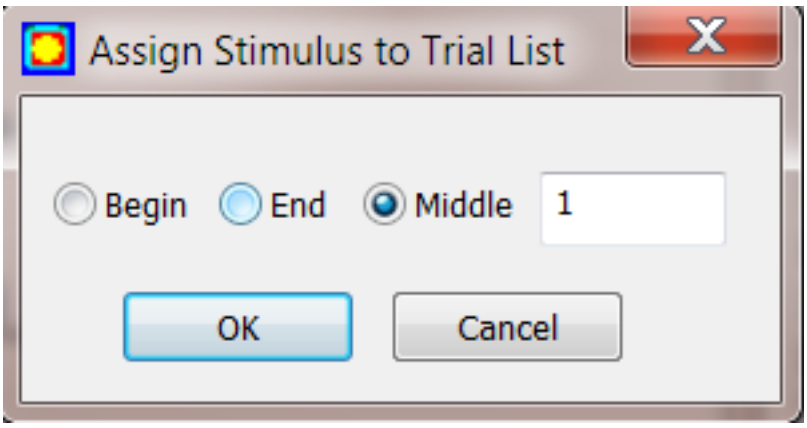
Move Stimulus

This function moves the selected stimulus from one position to another position. The Stimulus ID will therefore change accordingly.

If the “Dynamic List…” is checked, the presentation order will be refreshed if necessary.

Assign Stimulus to Trial (Present…)

This function assigns the selected stimuli to the Presentation List. The selected stimuli can be assigned to the beginning, end or middle (a specific presentation ID can be defined).



Copy Select Stimuli

This function copies the selected stimuli to the clipboard for past to the current or another stimulation file.

Cut Select Stimuli

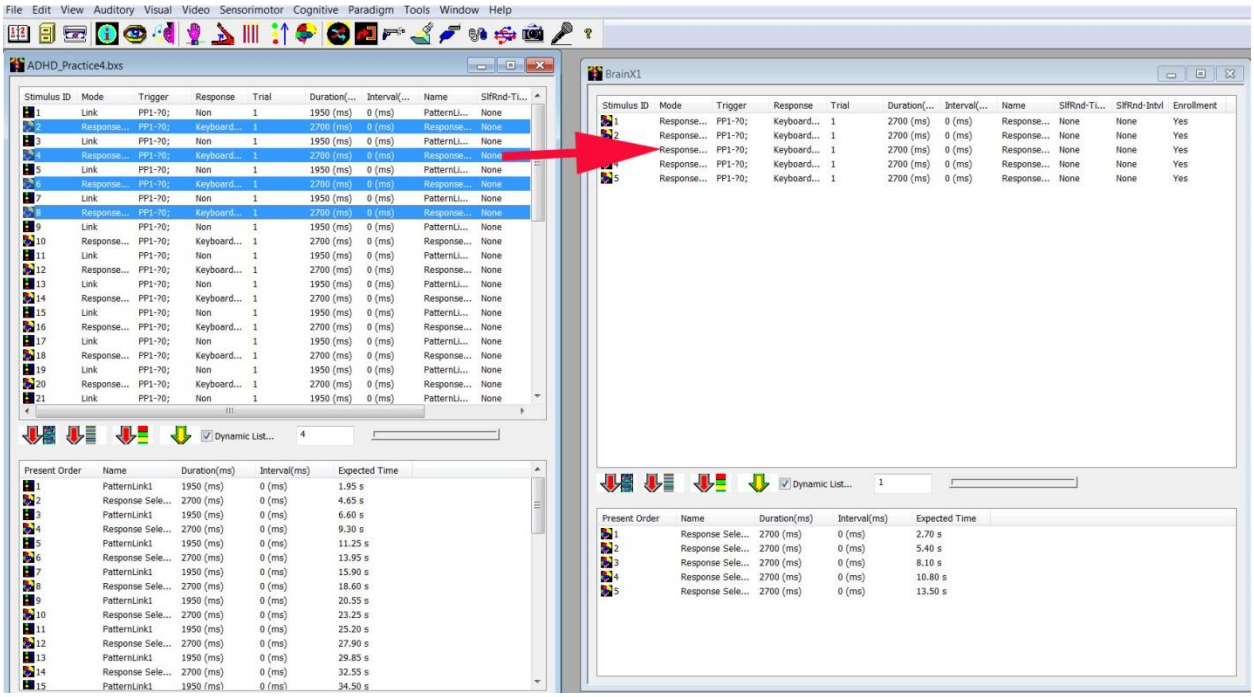
This function cuts the selected stimuli to the clipboard for past to the current or another stimulation file. Of note, the “Cut” function can be used to delete the selected stimuli.

Paste Select Stimuli

This function pastes the stimuli in the clipboard to the current stimulation file. Of note, the stimuli in the clipboard can be from the current document or other documents.

Drag-Drop to Ending

This function allows dragging selected stimuli from one document to another document. This feature is very useful for designing sophisticated cognitive brain function.

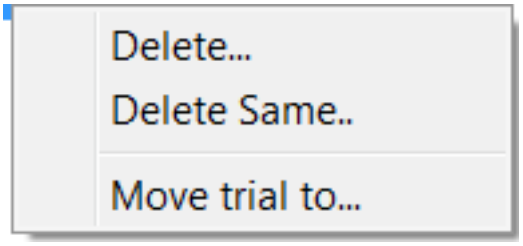


Drag-Drop to Highlighting

This function enables to drag selected stimuli from one document to another document in the highlighted position with Mouse.

Popup Menu in Presentation Panel (press the right mouse button)

BrainX provides a set of function to edit the presentation (see following Figure). Users can press the right mouse button to elicit the Popup Menu.



Delete (presentation item)

The “Delete…” function deletes the selected presentation item.

Delete Same (presentation item)

The “Delete Same…” function deletes all the presentation items from the same stimulus.

Move Trial To… (Presentation item)

The “Move Trial To…” function enables users to move the selected presentation items from one position to another position. A dialog will be provided for users to decide the moving position with specific ID.