

Tutorial: Using the Randomization feature of Proteus Editor

The Random Options feature of Proteus Editor allows you to select a group of segments within a session (or even the entire session) and automatically and randomly vary certain of the segment parameters within ranges you've set. Some of the applications for this feature include:

- Quickly creating novel, visually interesting stimulation paradigms
- Varying the precise stimulation frequency within a target band (for example, alpha)
- Creating broadband stimulation protocols for overall activation (this approach is called "Brain Brightening" by Dr. Thomas Budzynski)

This tutorial will describe how to create your own randomly-varied programs, using the above three applications as examples.

You can access the Random Options via the Utilities menu. Two menu items are available: Randomize Selected Segments, and Edit Random Preferences. The first step in creating a program with randomized parameters is to select which of the parameters will be affected. Choices available include Channel 1 (red light) and 2 (green or blue light) frequency range and brightness, audio pitch, and segment time. In every case you choose maximum and minimum values, which set the range within the randomization will take place. An important detail is that the light frequencies are varied in one-tenth hertz increments; this is important when the goal is to stimulate a particular frequency range (for example, the 13-15 hz "peak performance" frequency range) since the most effective stimulation frequency for a give person is not likely to happen to be an integer.

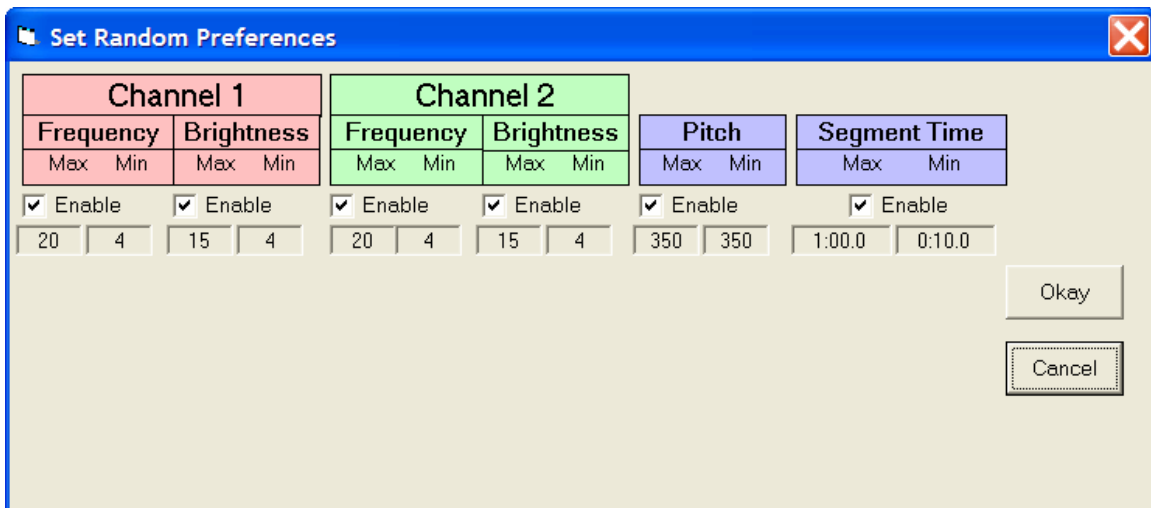


Figure 1: the Set Random Preferences menu choices, accessed via Utilities/Random Options.

Notice also that each parameter has a check box associated with it, so you don't have to randomize all of the parameters in order to use this function.

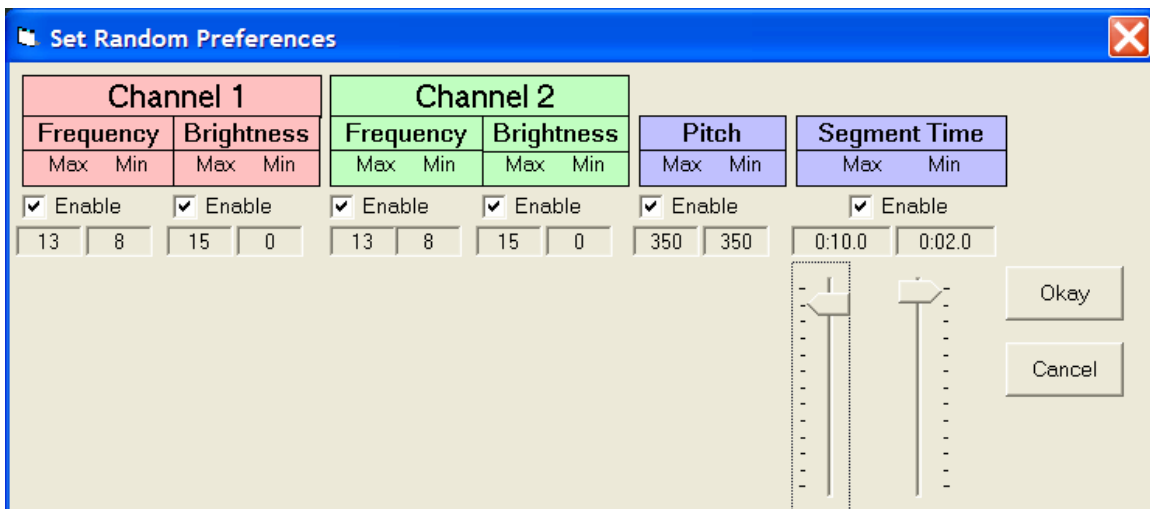
Example 1: exploring visual imagery

In this exercise we'll create a 50 segment session with a broad range of visual stimulation frequencies—but all are within the 8 to 13 hz range within which the most interesting “patterns” seem to appear.

Step 1: Create a new file. Do this either by clicking the “New File” button on the button bar at the top of the Proteus Editor screen; using File/New; or pressing F1. When the dialog box asking how many segments for the session appears, enter 50.

Step 2: Select all segments. Do this either via Edit/Select All or by pressing Ctrl-A.

Step 3: Set the Random Preferences. Utilities/Random Options/Edit Random Preferences takes you there. Once this dialog box is open, set it up to look like this:



When you click on one of the numbers in the bottom set of display boxes, controls will appear (in the above example, I've clicked on the Segment Time max. length box, the number 10.0). You can change values either by left-click-dragging on the sliders, or clicking on a slider to select it and using the up and down arrow keys to move it along in small increments. Although in this example both channels are set to a maximum frequency of 13 hz, there is no particular reason why you should not set it to, for example, 13.3 hz.

When you are done, click Okay. You're ready to create your first randomized session.

Step 4: Create a new session. Left-click the New File button, and enter 100 for the number of segments in the session. Next, select Edit/Select/All (or Ctrl-A) to select all the segments for randomization. Finally, choose Utilities/Random Options/Randomize

Selected Segments (or Ctrl-R). Notice what has happened to the values entered into the various segments. Each time you Randomize Selected Segments all (more precisely, nearly all) of the numbers will change to new values.

Step 5: Save the session. Finally, save the session in preparation for uploading to the Proteus using the File/Save As (or Shift-F3) and save it into a folder, preferably a subfolder of the Proteus Editor. Try randomizing these 100 segments again several times, saving each with a new name; this way, you can collect them into an album and upload a group of them to the Proteus for later experimentation.

Variations:

- Open the Edit Random Preferences dialog box again and change the minimum and maximum times—for example, to between 4 and 15 seconds.
- Select the first 50 segments (by left-clicking in the “1” Segment Number box and dragging downwards until the first 50 segments are highlighted) and randomize them with one set of times, then change the times in the Edit Random Preferences dialog, select the second 50 segments, and randomize those.
- Set the Channel 1 frequency range to a slightly different set of values than Channel 2; for example, 8.5 to 12.5 hz.
- Set Channel 2 (green or blue) to vary between brightness levels 9 and 12, while Channel 1 varies between 0 and 15.

When running a visualization session created in this manner, notice when the visuals are especially interesting, then take your glasses off and notice where you are in the program time. You can then locate which segment was running by clicking through the segments while watching the Time To End of Selected Segment box at the bottom right of the Proteus Editor main window.

In this way you can begin constructing “libraries” of visual effects—segments which are especially powerful or visually interesting.

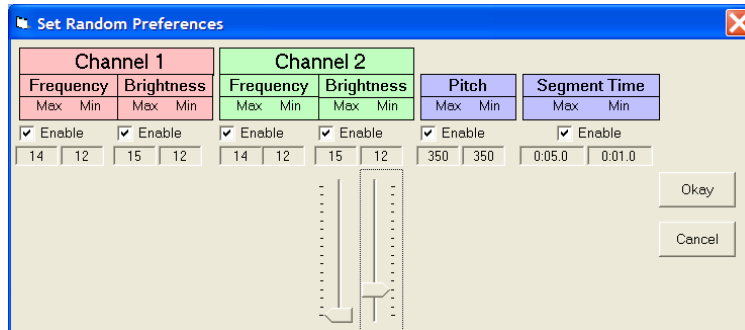
Exercise 2: Varying frequencies within a target band

In this exercise we'll create a program which varies only within a limited frequency range—high alpha (in this case, 12-14 hz). This is a range which some researchers have correlated with enhanced cognitive performance, so it is possible that increasing the amplitude in this range could lead to enhanced cognitive performance.

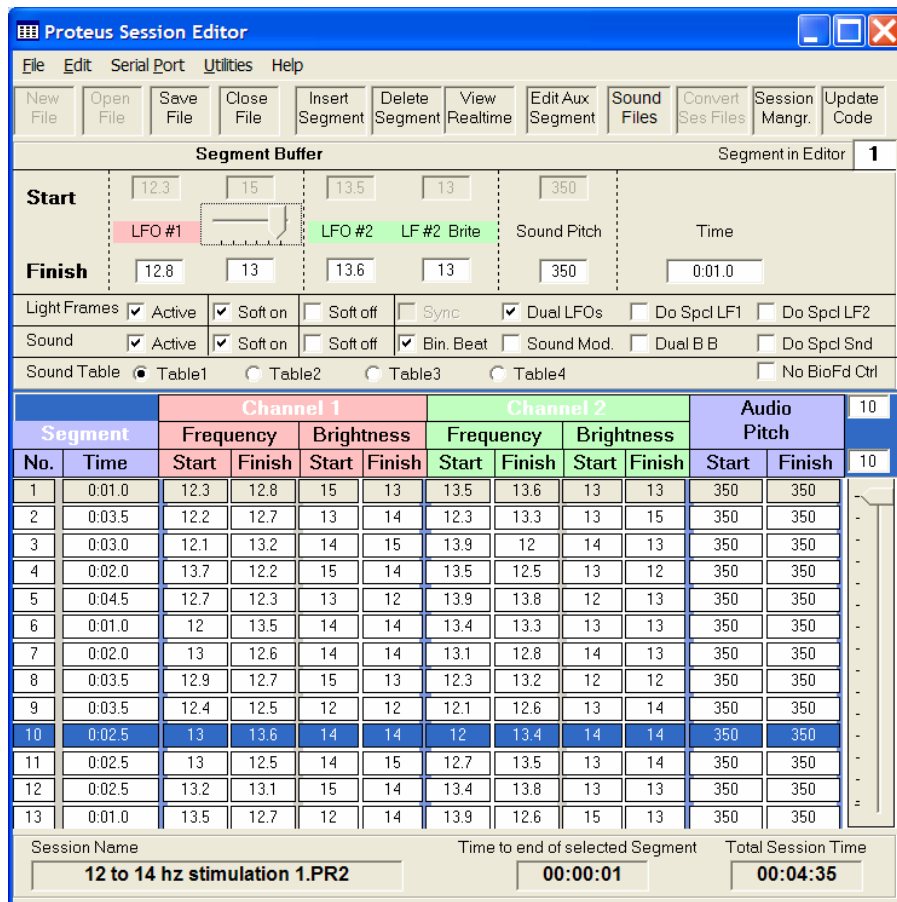
Also, let's set the brightness range fairly high—since our goal here is stimulation rather than visualization. Try starting with 12-15 for the brightness range for both colors; the reason for not simply setting them both to maximum is that some variation in brightness can increase overall attention, as the brain automatically increases attention when sensory stimulation changes noticeably. Also, set the segment times to shorter intervals—say,

one to five seconds per segment. This will allow more rapid activation of networks close to one another in resonant frequency.

Here's how the Random Settings should appear:



Repeat the session creation process described above, using these settings. You should end up with a screen that looks something like this:



Notice that the total session time in this case is only 4 minutes 35 seconds long—you might find experimentation with short sessions like this beneficial, since it is usually

much easier to find an extra five minutes for a session during the day than, say, half an hour!

Variations:

- Change the segment time range to longer periods—say, 2 to 8 seconds—while keeping the total number of segments at 100.
- Change the segment time range to shorter periods, such as 0.5 to 2 seconds—but this time create a session with 400 segments.
- Narrow or broaden the frequency range. For example, set the frequencies to 12.5 and 13.5 hz. Notice how you feel during and after this session and compare it to the earlier 12 to 14 hz example. Does one of them make you feel better than the other? Compare a 12.5 to 13.5 hz session to another set to 13.5 to 14.5 hz. Which one makes you feel more alert?

We hope you find this tutorial useful!

--The MindPlace Staff--