

Training Tutorial

By

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Introduction

The following Tutorial comes as a result of work done with individuals with severe disabilities. In this work individuals were unable to successfully control their facial muscle for clicking and cursor control. An alternative approach had to be found. This tutorial guides you through this approach.

It starts with going through the Software and Hardware Setup. It then guides you through starting to work with the Brainfingers software. It then takes you through a 5 Step process of discovering and implementing the best control approach for individuals. While going through the 5 Step processes remember to keep moving along the setup and training process. This will improve the chances of keeping the user motivated and interested in learning to use Brainfingers. Do not get stuck on any one step.

We strongly recommend that you first learn to use the Cyberlink before training someone else. This is necessary to understand relationships between feelings behind the actions of the brainfingers. By doing this you will be better able to explain how to control brainfingers and more capable to choose which brainfingers would be more accessible to the one you are helping by comparing your signals to theirs.

Setting Up Hardware and Software

System Requirements

- Operating System
- Brainfingers software works best under Windows XP. Any computer that can run under Windows XP should have sufficient speed to run Brainfingers.
- CD Drive
- Available serial port
- If you do not have an available serial port (comport), a serial to USB adaptor can be used instead.

Included Cyberlink Components

- Cyberlink Unit (equipped with two AA batteries)
- 9 pin serial cable

- Serial to USB adaptor
- AC Adaptor
- Cyberlink Headband
- Cyberlink grounding strap connection
- Gel

Installing Brainfingers software

- 1) Close all applications on your computer.
- 2) Insert CD labeled "Brainfingers" into computer.
- 3) Follow installation instructions. If the installation does not automatically start, then open the CD and run "InstallV60...exe".

Setting Up the Cyberlink Hardware

- 1) Connect the 9 pin serial adaptor to the back of the Cyberlink Unit and to an available serial port (comport) on your computer.

Note: If you do not have an available serial port (comport) it will be necessary to use a serial to USB adaptor.

Using a serial to USB adaptor

- i. Attach one end of the provided 9 pin serial adaptor to the back of the Cyberlink Unit.
 - ii. Attach the remaining side of the provided 9 pin serial cable to the serial to USB converter and insert the adaptor into an available USB port on your computer
- 2) The Cyberlink can be used without an external power supply. However, a power adaptor may be attached to the port on the top left region of the Cyberlink unit and plugged into a wall outlet if you do not wish to operate on battery power.

Note: If you are using a Laptop computer with its AC power supply, and the AC power supply has a plug with only two prongs of the same size, then be sure to use the provided grounding strap as well.

Using the Cyberlink Grounding Strap Connection

- i. Insert grounding strap eye between serial cable connector and back of laptop computer or Cyberlink control box.

Note: For overseas models, you may need a conversion plug

- ii. Insert grounded plug into a properly grounded wall outlet.

Cyberlink Headband

- 1) There are three sensors attached to a sensor harness inside the cloth headband. Rotate the three sensors so that the faint line on each of the sensors is horizontal.
- 2) Apply a small amount of gel to the surface of the sensors.
- 3) Center sensors in the middle of your forehead and adjust the Velcro straps for a secure fit around the head.
- 4) Plug the cord that extends from the headband into the port at the front of the Cyberlink Unit.

Note: The headband will require routine maintenance over time. It is important to attend to this maintenance to retain a quality signal from the headband. We recommend cleaning the headband every three weeks and replacing the sensors every three months.

Sensor Maintenance

- 1) Place your thumb in between the sensor and the headband.
- 2) While applying downward pressure with your thumb, turn the sensor and gently pull up.

Cleaning the Sensors

- i. Once you have removed the sensors you can clean them with warm water and soap.
- ii. We also recommend cleaning the place where the sensor meets the sensor holder with a Q-tip and alcohol

Sensor Replacement

- i. Contact Support to order new sensors
- 3) Turn the sensors while applying pressure to reinstall them into the sensor holders

Getting Started with the Brainfingers Software

Running the Brainfingers Software

- 1) Make sure that the Cyberlink headband is secured to your head and plugged into the Cyberlink Unit, and that the Cyberlink Unit is properly connected to your computer.
- 2) Double click on the Brainfingers icon on desktop or go to your Start menu and select "Brainfingers" from the list of programs.
- 3) If this is your first time using the software, a screen will appear that asks you to type your user name. Type the name of the current user and select "Continue".

4) You will now see a screen called "Auto Adjustment Window"

Brainfingers Auto-Adjust

The yellow line that you see corresponds to your B11 muscle brainfinger and goes up and down in response to your facial muscle tension and facial relaxation. During the Auto-Adjustment, it is important to keep the yellow line as close to the green base line as possible. Relax your facial muscles to do this. The actual value of the Auto-Shift is not important and may vary between different uses and users. The more you relax your facial muscles, the lower the yellow line and Auto-Shift value will be.

- 1) Relax facial muscles
- 2) Select "Start Auto-Adjust"
- 3) Sit quietly while a blue bar scrolls across the bottom of the window
- 4) In the following window, try alternating relaxing and tensing your facial muscles to see if you can comfortably move the yellow bar within the blue region.
- 5) Select "Apply New Adjust" if you are able to comfortably move the yellow bar within the blue region. Otherwise, select "Auto Adjust Again".

If the message "Base Value Too High" comes up:

A problem has been detected that indicates the muscle brainfinger (B11) Base-Value is too high. Have someone else wear the Cyberlink headband to determine if the high B11 base value is due to you or the hardware. Follow Auto-Adjust Help screens to work with problem.

Note: If at first you can't control B11, through practice you may be able to control the muscle brainfinger voluntarily. As you continue using the software, you will also be able to manually adjust the muscle brainfinger and have the option to use an alternative brainfinger to control.

If problem persists, and is due to the hardware, consider the following:

- i. Is the headband connected to the Cyberlink?
 - a. Check the Cyberlink headband connection
 - b. See *Using the Cyberlink Headband*
- ii. Are you using a laptop computer?
 - a. If the laptop's power supply is in use and has only 2 prongs, the computer may not be properly grounded.
 - b. See *Using the Cyberlink Grounding Strap*

- iii. Is your power outlet properly grounded?
 - a. Make sure the power outlet to which you have connected your computer or Cyberlink Unit is properly grounded.
- iv. Has the Cyberlink Unit worked in the past?
 - a. If the Cyberlink Unit has worked in the past and is not working now, the headband may be the problem.
 - b. See *Sensor Replacement* and *Cleaning Sensor Holders*
 - c. Sensor harness may have failed, in which case please contact Support for help

Brainfingering Display

The top panel of eleven vertical bars corresponds to brainfingers B1-B11 (numbered from left to right). The brainfingers represent electrical muscle and brain wave signals that have been detected by the Cyberlink headband and deciphered and digitized by the Brainfingers software. The bars will fluctuate in height in response to left/right eye glances, changes in alpha or beta brain waves, and facial muscle activity.

- ***B1- B3 LR Glance***
 - The blue vertical bars correspond to left/right (LR) glances. Left/right brainfingers will increase with eye movement and decrease when eye movement is reduced.
- ***B4-B6 Alpha***
 - The green vertical bars correspond to alpha brain waves. Typically, an increase in the height of B4-B6 may be achieved by relaxing the muscles in the back, maintaining a soft focus, and allowing the brain to become 'quiet' or 'still' as if in a daydream.
- ***B7-B10 Beta***
 - The red vertical bars correspond to beta brain waves. Typically, when the brain is 'excited,' or over stimulated, B7-B10 will increase in height.
- ***B11 Muscle***
 - The yellow vertical bar, located on the right side of the screen, corresponds to facial muscle activity. The bar will increase in height in response to raised eyebrows or a clenched jaw. The bar will decrease in height when you relax your facial muscles.

Note: Try spending a few minutes observing how the brainfingers fluctuate when you try various facial movements.

Brainfingert Adjustments

The brainfingers may need to be adjusted before you continue using the Cyberlink. To determine if an adjustment is needed, it is important that you first spend a few minutes observing how brainfingers fluctuate as you try various facial movements. Next, observe where the brainfingers tend to fluctuate without effort. An adjustment of B1-B10 and/or B11 will be necessary if most of B1-B10 and/or B11 do not tend to fluctuate within the blue region. Adjustments made in the main display will apply to "Brain Candy" and "Brain Billiards".

- 1) Select "Adjustments" from the tool bar.
- 2) Select "Shift & Amplify"
- 3) **Shift:** Shifting may be used to bring the brainfingers within a useful range. Select and drag the shift bar up or down to change the Shift Value.
 - a. If B11 or most of B1-B10 fluctuate most often below the blue region shift upwards (increase the Shift Value)
 - b. If B11 or most of B1-B10 fluctuate most often above the blue region, shift downwards (decrease the Shift Value)

Note: Once you have shifted the brainfingers, amplifying to increase the range of brainfinger fluctuation may not be necessary.

- 4) **Amplify:** To modify the range of fluctuation of B11 or B1-B10, select and drag the amplification bar up or down. Adjusting amplification changes the responsiveness of the brainfingers.
 - a. To increase the range of fluctuation of B11 or B1-10, amplify more (increase the Amplification Value)
 - b. To decrease the range of fluctuation of B11 or B1-B10, amplify less (decrease the Amplification Value)

Note: B11 **Shift** may also be adjusted automatically by selecting "B11 Auto Adjust" from "Adjustments".

Step 1

Can be done in 15-20 minutes

The goal for Step 1 is to observe and create a table of brainfingering response to facial gestures, and to introduce the user to the various Brainfingering Training Games.

Begin with the Muscle Signal

Either startup and access the Auto-Adjust window or restart the Auto-Adjust window by selecting Adjustments and then Auto-Adjust. To do the adjustment, relax the facial muscles to keep the yellow line as low as possible then click on START AUTO-ADJUST.

1. Select "Apply New Adjust" if you are able to comfortably move the yellow bar within the blue region. Otherwise, select "Auto Adjust Again".
2. If the adjustment was unable to successfully be made, skip the Auto-Adjust by clicking on CLOSE AUTO-ADJUST. Adjustments and fine tuning can be done manually by way of the Brainfingers Display, as well as using the training games, or the user may need to skip the signal all together.

Setting up the Brainfingers Display Screen

1. Observe the behavior of the eleven brainfingers to see if adjustments are needed. If several of the brainfingers fluctuate most often above or below the blue horizontal boundary, go to the toolbar and click on ADJUSTMENT, and then SHIFT & AMPLIFY FOR B1-B10 AND B11.
2. First adjust SHIFT and then adjust AMPLIFY with the goal of adjusting so most of the brainfingers move equally above and below the dark blue boundaries. Even if the majority of brainfingers do not fluctuate within the blue boundaries after the adjustments, continue on with mapping the brainfingers using a copy of the table presented below. Later the brainfingers can be fine-tuned as part of interacting with and learning to control brainfingers through the training games.

Mapping Brainfingers to Facial Gestures

We provide a table for mapping brainfingering activity to facial gestures. Mark in the table which brainfingers fluctuate consistently in the same direction for each of the facial gestures performed. Place an up arrow or down arrow to indicate which direction brainfingers move, or leave blank when there is little to no movement. If you are administering the exercise to the user, we have provided example cues that may help

stimulate the desired action. If the user is unable to perform any of the suggested gestures, skip over the gesture and continue to the next gesture. This exercise should take no more than five to ten minutes. Perform the facial gestures a second time and watch the rise and fall of the brainfingers. For the brainfingers that have the greatest fluctuation within the blue boundary, circle the corresponding brainfinger-facial gesture arrows. We recommend that you make copies of the Brainfinger-Gesture Mapping table and work with copies of the table. It is a good idea to practice creating tables for yourself and a few friends before working with users that have severe disabilities. In Step 2 (Page 20), you will use the table information to determine which brainfingers would be best to try for clicking. In Step 3 you will determine which brainfingers would be best for cursor movement.

Relax												
Stare												
Close Eyes												
Look Right												
Look Left												
Lift Eyebrows												
Bite												
Clenched Jaw												
	LR Glance B1	LR Glance B2	LR Glance B3	Alpha B4	Alpha B5	Alpha B6	Beta B7	Beta B8	Beta B9	Beta B10	Muscle B11	

If person is unable to follow verbal directions, consider the example cues.

- i) Relax the facial muscles
Example Cue: "Make the color bars go down."
- ii) Stare or let the eyes go out of focus.
Example Cue: Place a motivating object at eye level.
- iii) Look to the right
Example Cue: Quickly show the motivating object to the right of the computer screen.
- iv) Look to the left
Example Cue: Quickly show the motivating object to the left of the computer screen.

- v) Close eyes
Example Cue: Briefly place hand over user's eyes.
- vi) Lift eyebrows
Example Cue: Gently lift user's eyebrows and release then request.
- vii) Bite
Example Cue: Direct to bite as if eating.
- viii) Clench jaw
Example Cue: "Pretend that you do not want to eat."

Example Brainfinger-Facial Gesture Table for Persons without Disabilities

Below illustrates the directional norms of the brainfingers for individuals without disabilities. When facial movements were preformed, an up or down arrow was drawn to indicate the direction of the brainfingers and left blank when there was little to no movement.

Relax	↓	↓	↓	↑	↑	↑	↓	↓	↓	↓	↓
Stare	↓	↓	↓	↑	↑	↑	↓	↓	↓	↓	↓
Close Eyes	↓	↓	↓	↑	↑	↑	↓	↓	↓	↓	↓
Look Right	↑	↑	↑			↓	↑	↑	↑	↑	↑
Look Left	↑	↑	↑			↓	↑	↑	↑	↑	↑
Lift Eyebrows						↑	↑	↑	↑	↑	↑
Bite						↑	↑	↑	↑	↑	↑
Clenched Jaw						↑	↑	↑	↑	↑	↑
	LR Glance B1	LR Glance B2	LR Glance B3	Alpha B4	Alpha B5	Alpha B6	Beta B7	Beta B8	Beta B9	Beta B10	Muscle B11

An Explanation of the "Normally Expected" Brainfinger Responses

- 1) B1-B3 LR Glance: When the eye muscles are not in motion (relaxed, staring, and closed eyes), the signals should go down and rise when the eyes are in motion (looking left or right).
- 2) B4-B6 Alpha: When the mind is "quiet" (relaxed, staring, and closed eyes) alpha brainfingers typically raise and then fall as the mind

generates activity. However, B6 receives a slight residual effect from the facial muscle signal producing an increase of signal activity when the mind generates activity.

- 3) B7-B10 Beta: When the mind is "excited" (looking right or left, lifting eyebrows, biting, and clenching the jaw) the brainfingers should rise and then fall as the mind quiets. In addition, the brainfingers receive some residual effects from the facial muscle signal producing an increase of signal activity.
- 4) B11 Muscle: When the facial muscles tense the brainfinger increases and decreases as the facial muscles ease.

An Example of How Candidate Brainfingers Were Selected

The following table was taken from the Case Study done by Danise Marler; the table is for Subject D. From the table, Dani concluded that this user would have difficulty operating computer functions efficiently and effectively with the B11 brainfinger. The table displays other possible brainfinger options for control. For example, for clicking and up/down cursor maneuvers, B6 and B7 looked to be good choices. B2 appeared to be the best choice for left/right control. In fact, when B6 was setup for clicking and B7 was setup for cursor up/down, user control improved dramatically.

Relax	⊕↓	⊕↓	↓	⊕↑	↑	⊕↑	⊕↓	↓	↓	↓	⊕↑
Stare	↓	⊕↓	⊕↓	↑	↑	⊕↑	⊕↓	↓	↓	⊕↓	⊕↑
Close Eyes		⊕↓	↓	↑	⊕↑	⊕↑	⊕↓	↓	↓	↓	⊕↑
Look Right		⊕↑	⊕↑			⊕↓	↑				↑
Look Left		⊕↑	⊕↑			⊕↓	↑				↑
Lift Eyebrows							⊕↑	↑	⊕↑		↑
Bite							⊕↑				↑
Clenched Jaw							⊕↑				↑
	LR Glance B1	LR Glance B2	LR Glance B3	Alpha B4	Alpha B5	Alpha B6	Beta B7	Beta B8	Beta B9	Beta B10	Muscle B11

When you build a brainfingert-gesture table, you may find that the table is different for the individual you test as compared to the normative table above. The differences between the data you generate in the table and the norms shown on the last page should be respected. These differences may provide important insight into how best to setup the user's brainfingers for control.

Brainfingert Training Games - Initiating Motivation and Insight

The following games automatically begin with brainfingert B11 setup as the control. We recommend that you start the training process using B11 even if the user's facial muscles seem too tight, spastic, or lack muscle tone. Using B11 enables the trainer to teach by modeling a facial movement and then observe if the user is performing the facial movement.

If it seems the user is unable to play a game, DO NOT STOP moving forwards with the games. Continue onto the next game so as to continually encourage the user by showing what will be learned. A good motivational cue is to tell the user that when they learn how to do "this" they will be able to play video games or operate software.

Note: The first time operating Cyberlink Brainfingers can be exhausting. To comfortably learn and operate Brainfingers, it is suggested that the user only play the games for 15-20 minutes the first time. Quickly run through the games to give the user a short opportunity to operate each game. Generally, 'Pong' is the last game played.

Brain Candy

Increase your speed in Brain Candy by raising the yellow bar (B11) in the bottom right of the screen (tensing your facial muscles). To slow, lower the yellow bar (B11) by relaxing facial muscle tension. If the user is significantly visually impaired, skip the game. Also, if after trying to adjust B11, B11 is still fully extended to the top of the display, or B11 does not fluctuate, skip the game. Adjustments made in the main display apply to Brain Candy.

- 1) Select "Brainfingers Practice" from the toolbar
- 2) Select "Brain Candy"
- 3) Adjust the practice time by selecting "More" or "Less"

4) Select "Run Brain Candy"

Note: You may close Brain Candy at any time by pressing the "Esc" key.

Click Setup

Click Setup is a starting point for brainfingering "click" control. Click Setup will have additional applications in Step 2. The yellow brainfingering line corresponds to B11, muscle brainfingering (the yellow vertical bar in the main display).

- 1) Select "Click Practice" from the tool bar
- 2) Select "Click Setup"
- 3) Select "Simple Click," from the center of the screen (if it is not already selected)
- 4) Relax your facial muscles to bring the yellow brainfingering line as close to the green time line as possible for 5 seconds
- 5) Bring the brainfingering line above the trigger line by clenching your jaw, lifting your eyebrows, and/or biting to signal a "bing" sound. Repeat 5 times.

Adjustments

If you have difficulty controlling the brainfingering line, try making an adjustment.

1. Select "Adjustments" from the tool bar
2. Select "Shift & Amplify"
3. **Shift:**
 - a. Shift down if you are unable to lower the brainfingering line by relaxing and/or hear a continuous "binging". Shift until the brainfingering line is below the click trigger line.
 - b. Shift up if you are unable to raise the brainfingering line above the click trigger line. Do not shift the brainfingering line above the click trigger line.
- Amplify:** Amplify only if you would like to increase or decrease the yellow line's range of fluctuation after you have shifted
4. Select "Apply" to keep changes
5. Repeat Click Setup procedures 1-4 and adjust as needed

Note: If you are unable to control the brainfingering line (B11) after making adjustments, proceed to the next exercise anyway.

- 6) Select "Close" when you are finished

Click Game

The Click Game provides additional practice using your brainfingers to perform the "click" function of a traditional mouse. Once the game is started, the object is to raise the brainfinger line above the trigger line to "click" when you see a target. Adjustments made in Click Setup will be maintained in the Click Game. If you are unsuccessful after three minutes, continue to the next exercise.

- 1) Select "Click Practice" from the tool bar
- 2) Select "Click Game"
- 3) Select "Game Options"
- 4) Select "Number of Targets per Trial" (we suggest starting with 4-8 targets per trial)
- 5) After selecting the number of targets per trial, select "Okay"
- 6) Select "Start"

Adjustments

If you have difficulty controlling the brainfinger line, try making an adjustment.

1. Select "Adjustments" from the tool bar
2. Select "Shift & Amplify"
3. **Shift:**
 - a. Shift down if you are unable to lower the brainfinger line by relaxing and/or hear a continuous "binging". Shift until the brainfinger line is below the click trigger line.
 - b. Shift up if you are unable to raise the brainfinger line above the click trigger line. Do not shift the brainfinger line above the click trigger line.
- Amplify:** Amplify only if you would like to increase or decrease the yellow line's range of fluctuation after you have shifted.
4. Select "Apply" to keep changes
5. Select "Start" to restart the game

Note: If you continue to have difficulty clicking, select "Compensate for False Clicks"

- a. If a voluntary click is followed by an involuntary/false click, try increasing the "Release Time"

- b. If spasming is causing unintended clicks, and you are able to hold a "click" for a duration of time longer than the unintended clicks, try increasing the "Accept Time"

- 6. Select "Apply" to keep changes
- 7. Select "Start" to restart game

7) Select "Stop" if you would like to pause the game and "Close" to exit

If unable to click within three minutes, do not stop moving forwards in the training. Go to the next game. Changing to an effective signal band will occur in Step 2. Fine tuning the usable signal will occur throughout the training steps.

Grow Game

Brainfinger activity is applied to movement along the up/down or left/right axis. As you raise and lower your brainfingers, colored rings will expand or contract from the center of the screen and you will hear music. Alternate the axis control to simulate either up/down cursor movement or left/right cursor movement. The colored slide boxes on the left, or the bottom of the screen, correspond to brainfingers B11 and B2.

- 1) Select "Mouse Practice" from the tool bar
- 2) Select "Grow Game"
- 3) Select "Start Game"
- 4) The green box to the left of the screen will move up or down as you increase or decrease B11. Music will begin and colored rings will begin to expand from the middle of the screen when you raise the yellow box above the white line.

Adjustments

If you are unable to control the movement of the colored box (B11 or B2), try making an adjustment.

- 1. Select "Adjustments" from the tool bar
- 2. Select "Shift & Amplify"
- 3. **Shift:**

- a. Shift down if you are unable to move the box below, or to the left of the yellow line. This should enable the colored rings to shrink.
- b. Shift up if you are unable to move the box above, or to the right of the yellow line. This should help you expand the colored rings and trigger the music.

Amplify:

- a. Amplify more if you would like to increase the range of the box's movement. This will increase the responsiveness of the box movement.
 - b. Amplify less if you would like to make the brainfinger and box movement less sensitive.
2. Select "Apply" to keep changes
 3. Continue playing by selecting "Start" and adjust as needed
- 5) Once you are able to control B11, select "Stop Game"
 - 6) Select "Axis to Control"
 - 7) Select "Left/Right," the left/right axis is automatically configured to be controlled by B2 (left/right glance).
 - 8) The blue box at the bottom of the screen moves left or right as you increase or decrease B2. Music will begin and colored rings will begin to expand from the middle of the screen when you move green box to the right of the white line.
 - 9) Select "Start Game"

Note: If you have difficulty, try the *Adjustments* procedure above or consider the following:

Add Glance Left/Right Control

Glance Left/Right Control allows you to move the blue box in the direction of your eye glancing. By adding Glance Left/Right to B2 control, the direction the blue box moves depends on which way you glance with your eyes.

1. Select "Adjustments" from the tool bar
2. Select "Brainfinger Selection"
3. Under "Add Glance Left/Right Control" , click on the down arrow
4. Select "Add To Brainfinger 2"
5. Select "Apply New"
6. Indicate which side the headband is on
7. The blue box now moves left when you glance left from center, and moves right with you glance right from center. It is necessary to look forward and to the center

of the screen and wait until "Ready" appears after each glance.

- 10) Once you are able to confidently control left/right movement, select "Stop Game"
- 11) Select "Close" to return to the main display at any time

Pong Game

The paddle's movement is controlled by the same means you controlled the colored box in previous exercises. You can rotate the Pong screen to practice controlling the Pong paddle along both the up/down and left/right axis.

- 1) Select "Mouse Practice" from the tool bar
- 2) Select "Pong"
- 3) Select "Start Game." Movement along the up/down axis is controlled by B11.

Adjustments

If you are unable to control the paddle (B11 or B2), try making an adjustment.

1. Select "Adjustments" from the tool bar
2. Select "Shift & Amplify"
3. Shift:
 - a. Shift down if you have difficulty lowering the paddle, or moving it left.
 - b. Shift up if you have difficulty raising the paddle, or moving it right.
- Amplify:
 - a. Amplify more if you would like to increase the range of the paddle's movement.
4. Amplify less if you would like the paddle to fluctuate less.
5. Continue playing by selecting "Start" and adjust as needed

- 4) Select "Stop" when you are ready to proceed
- 5) Select "Axis to Control" from the tool bar
- 6) Select "Left/Right"

- 7) Select "Start Game" Movement along the left/right axis is controlled by B2.

Note: If you are unable to control the left/right movement of the paddle, see *Adjustments* or consider the following:

Add Glance Left/Right Control

Glance Left/Right Control allows you to move the blue box in the direction of your eye glancing. By adding Glance Left/Right to B2 control, the direction the blue box moves depends on which way you glance with your eyes.

1. Select "Adjustments" from the tool bar
2. Select "Brainfingering Selection"
3. Under "Add Glance Left/Right Control" , click on the down arrow
4. Select "Add To Brainfingering 2"
5. Select "Apply New"
6. Indicate which side the headband is on
7. The blue box now moves left when you glance left from center, and moves right with you glance right from center. It is necessary to look forward and to the center of the screen and wait until "Ready" appears after each glance.

- 8) Once you are able to confidently control right/left movement, select "Stop Game". Select "Close" to return to the main display at any time.

Additional Options

You may adjust any of the additional options to change the level of difficulty of the game.

1. Select "Game Options" from the tool bar
2. You may change the settings of the following options:
 - a. Paddle Size
 - b. Skill Level of Computer
 - c. Ball Speed
 - d. Ball Size
 - e. Balls Per Game
3. Select "Okay"
4. Select "Start Game" to resume game with adjusted settings

Normally, this is where the first day of training would end. Before going onto Step 2, wait at least two hours. However, it is better for the user if the training continues onto the next day. If the user wants to continue, or there is still time within the twenty minutes of training, go onto the Easy Maze, and if the user wants to continue on to the Labyrinth.

Easy Maze Game

The Easy Maze allows you to practice up/down and left/right cursor movement simultaneously. As in previous applications, up/down movement is automatically configured to respond to raising and lowering B11 and left/right movement is automatically configured to be controlled by raising and lowering B2. If after adjusting or changing the brainfingers in use, you are still unable to control the maze, skip to the next activity.

- 1) Select "Mouse Practice" from the tool bar
- 2) Select "Easy Maze"
- 3) Select "Start Game"

Adjustments

If you have difficulty controlling the cursor movement, try making an adjustment.

1. Select "Adjustments" from the tool bar
2. Select "Shift & Amplify"
3. **Shift:**
 - a. Shift down if you are unable to move the cursor down or left.
 - b. Shift up if you are unable move the cursor up or right.
4. Select "Apply" to keep changes
5. Continue playing by selecting "Start" and adjust as needed

Note: If you still have difficulty controlling left/right cursor movement consider the following:

Add Glance Left/Right Control

Glance Left/Right Control allows you to move the blue box in the direction of your eye glancing. By adding Glance Left/Right to B2 control, the direction the blue box moves depends on which way you glance with your eyes.

1. Select "Adjustments" from the tool bar
2. Select "Brainfinger Selection"

3. Under "Add Glance Left/Right Control" , click on the down arrow
4. Select "Add To Brainfinger 2"
5. Select "Apply New"
6. Indicate which side the headband is on
7. The blue box now moves left when you glance left from center, and moves right with you glance right from center. It is necessary to look forward and to the center of the screen and wait until "Ready" appears after each glance.

HUD

The HUD is an adjustable ring that surrounds the mouse. It can increase awareness of the mouse by creating a larger visual focal point. The HUD may be used to enhance concentration and aid the visually impaired.

1. Select "Adjustments" from the tool bar
2. To add or remove the HUD select "HUD Around Cursor On/Off"
3. Select "HUD Adjustments" to adjust the following
 - a. HUD Radius
 - b. HUD Thickness
 - c. HUD Opacity
 - d. HUD Colors
4. Select "Apply New"

Labyrinth Game

Labyrinth provides a more challenging version of Easy Maze. See *Easy Maze* for instructions and options.

Step 2

Recommended time: 30-45 minutes

The goal for Step 2 is to use the Brainfingert-Gesture Table to determine which brainfingert(s) has the best potential for single and multiple clicks, and to practice with this brainfingert(s) using the Click Game and with 3rd party software.

Selecting the Best Brainfingers for Clicking

Go to the Brainfingert-Gesture table you created. Look for brainfingert directional movements that exhibit opposite directions between opposite kinds of facial gestures. For example in the subject D table (page 10), opposite directions were observed for B2, B6 and B7. From the table Dani decided to try B6 or B7 as possible brainfingers for clicking. Through trial and error, B6 was determined to be the best brainfingert for clicking for subject D.

Once you decide on which brainfingers show the most promise for clicking, go to the Click Game, select a new brainfingert clicking and practice the click game with the new selection.

Click Game

Repeat playing the click game as you did in Step 1. Before playing the Click Game change the brainfingert for clicking based upon what you determine from analysis of the Brainfingert-Gesture table.

Change Clicking Brainfingert Control

1. Select "Adjustments" from the tool bar
2. Select "Brainfingert Selection"
3. Select the Brainfingert you want for control
4. Select "Change"

Have the user click in the Click Game and fine tune adjustments as needed

Adjustments

If you have difficulty controlling the brainfingert line, try making an adjustment.

8. Select "Adjustments" from the tool bar
9. Select "Shift & Amplify"
10. **Shift:**

- a. Shift down if you are unable to lower the brainfingering line by relaxing and/or hear a continuous "binging". Shift until the brainfingering line is below the click trigger line.
- b. Shift up if you are unable to raise the brainfingering line above the click trigger line. Do not shift the brainfingering line above the click trigger line.

Amplify: Amplify only if you would like to increase or decrease the yellow line's range of fluctuation after you have shifted.

11. Select "Apply" to keep changes
12. Select "Start" to restart the game

Note: If you continue to have difficulty clicking, select "Compensate for False Clicks"

- a. If a voluntary click is followed by an involuntary/false click, try increasing the "Release Time"
- b. If spasming is causing unintended clicks, and you are able to hold a "click" for a duration of time longer than the unintended clicks, try increasing the "Accept Time"

13. Select "Apply" to keep changes
14. Select "Start" to restart game

Once the user has worked with the Click Game and you have selected the best brainfingering for clicking and fine tuned user adjustments we recommend that you allow the user to work with 3rd party software. To operate 3rd party software you must go to the Launch Window

Launch

Launch is where the user fine-tunes control and/or to develop buttons for explicit controls before going to the computer's desktop to operate software. You can get to the Launch window from the Brainfingers Display toolbar or from the computer's desktop by clicking on the spaceship Launch icon. In the Launch window four predefined launch buttons labeled Single Switch Access to Desktop, Left and Right Mouse Button Access, Mouse Access to Desktop, and Cosmic Skateboard will be displayed.

For single switch access click on the first button. For multiple clicks choose the second button. Another window will pop up with additional

adjustments, all adjustments made prior carry over to Launch, so there probably will not be a need to adjust. If the signal used needs fine tuning, make the appropriate adjustments to shift and amplify. When satisfied with adjustments, click the Launch button. This will bring the user to the desktop, and access to 3rd party software.

Third Party Software

Choose software to operate

- 1) Third Party Software is software put into the computer to be directed and operated by the user.
- 2) Software that can be operated with the single switch click button:
 - a) Single Switch Software or Software with Switch Capabilities
 - b) Auditory and/or Visual Scanning Software with Switch abilities
 - c) Any software - Left Mouse Clicks to trigger applications while another person maneuvers the cursor
 - d) Any software - Left Mouse Click, Double Click, Right mouse Click, and Click and Drag while another person maneuvers the cursor.

Operate software

- Have a wait period of two hours before continuing onto the next step.

Step 3

Recommended time: 45 minutes to 1 hour

The goal for Step 3 is to continue to practice with the Brainfingert Games to determine which brainfingers are best for up/down and left/right cursor control.

- 1) Grow Game to map and make adjustments
 - 2) Pong to play and play with game options
 - 3) Cursor Setup to fine tune adjustments
 - 4) Easy Maze to play
 - 5) Labyrinth to play
 - 6) Cursor Setup with post-it targets to fine tune and practice moving cursor to a target
- Wait period of 1 hour before going onto the next step

Step 4

Recommended time: 1 to 1 ½ hours

The goal for Step 4 is to fine tune adjustments.

- 1) Mouse Setup
- 2) Acquire Game
- 3) Mouse setup with post-it targets.
- 4) Billiards game to play and to determine if the user has control.
 - Wait period of 30 minutes before going onto the next step.

Step 5

Recommended time: 1 ½ to 2 hours

The goal for Step 5 is to apply the skills learned in the Brainfinger Training Games to third party software.

Toolbar in Launch

Mouse Setup to check adjustments

Launch

- 1) Specialized Software
- 2) Universal Software

- After 1 ½ to 2 hours of training/practicing/operating, the user will need a 15-30 minute break.