

# Brainfingers™

USER MANUAL

Version 6.0

Brain Actuated Technologies, Inc.

Bringing the Gift of Hands-Free Access to the  
World

# Cyberlink Brainfingers™

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#### TO CONTACT US

Phone: 937 767 2674

Fax: 937 767 7366

Email: [support@brainfingers.com](mailto:support@brainfingers.com)

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All returns require prior approval. Customer is responsible for return shipping charges and must ship return via UPS, FED EX or other traceable shipping method to **B.A.T., Inc., 1350 President Street, Yellow Springs, OH 45387.**

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## • Quick Start

If you are familiar with Windows and you want to get up and running with a minimum of effort follow the steps below.

1. Connect Cyberlink Interface box to computer with included serial cable.
2. Insert CD, should start install automatically. If not, follow directions found on Install CD and within the file on the CD called **ReadMe.Txt**.
3. Put a little sensor gel on plastic sensors, put on headband. Plug headband cable into the Cyberlink Interface box.
4. Select the **Brainfingers** icon. It is best to run **Brainfingers** before running **Launch**.
5. Enter your name and then click on Continue. This should bring you into the beginning display, which shows your Brainfinger activity.
6. Work your way through the various menu options. If you only want click control to control a third party software program then once you find and setup an acceptable brainfinger click go to the menu choice **Launch**. From the **Launch** window select an existing launch button to go onto your desktop. Or create a new launch button with the Launch Wizard for the application you wish to use. Once you select a launch button you will be taken to the **Launch Console** window where you can fine tune your brainfinger signal before launching onto your desktop with brainfinger control.
7. From the various menu choices you can access training windows to practice first click control and then mouse control. Once you have mastered mouse control, you can go to the **Launch** window and launch onto the desktop using brainfingers as a mouse controller.
8. Note there are a number of **Help** menus that access Help windows to give helpful hints on how to setup and use the **Brainfingers** and **Launch** software. **Please read the Help windows!**

## • Cyberlink Brainfingers Explained

Cyberlink Brainfingers™ provide hands-free universal computer access by allowing you to control left and right mouse keys, move a mouse cursor, and control your keyboard, totally hands-free! In this way you can control most software including educational software and interactive video games, all without using your hands.

You wear a headband containing three sensors. The sensors detect electrical signals at your forehead resulting from facial muscle, eye, and brain activity.

The headband connects to an interface box, which amplifies filters and digitizes the headband signal and connects it to a computer. Connection to the computer is through the serial port (RS232). Under Windows XP you can use a serial to USB adaptor. We recommend using the Keyspan USA-19HS adaptor.

Within the computer your headband signal is separated into eleven channels. Technically speaking each channel is a narrow frequency band of voltage. The eleven channels are activated by facial gestures (i.e., a gentle eyebrow lift or jaw close), eye movements (i.e., a quick glance left or right), and brainwave changes (i.e., changes in alpha and beta brainwave activity). The eleven channels become your virtual fingers or “**Brainfingers**”.

By consciously changing the levels of your brainfingers, you can trigger mouse button clicks, move the cursor and control your keyboard.

### **Brainfingers support:**

- Hands-free mouse control
- Keyboard control
- Left and right mouse button clicks
- External switch closures
- Interactive video game control for many video games
- Music synthesis (in development).

# • System Components

## CYBERLINK HARWARE

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**HEADBAND:** Washable headband, 'hook and loop' closure with inner pocket for holding the sensor harness.

**SENSOR HARNESS:** Molded one-piece unit designed to slip in and out of the cloth headband. Special touch proof connection to the Interface Box is included. Extra strength harness cable for long life and durability.

**DRY SENSORS:** Specially molded plastic long-life sensors. Sensors snap through holes in Headband into Sensor Snaps in Headband Harness.

**CYBERGEL™:** A non-irritating hypoallergenic moisturizing gel made of organic 99% Aloe Vera designed to be used with dry sensors. The Gel moisturizes the skin to improve headband sensor connection to the forehead.

**GEL SENSORS:** Sensors snap through holes in Headband into Sensor Snaps in Sensor Harness. Gel sensors are recommended only for those situations in which excessive head movement exists, preventing use of the standard Cyberlink Headband. Contact us for further information about gel sensors.

**INTERFACE BOX:** Battery powered interface that amplifies, filters and digitizes the forehead signals and transmits the conditioned signals to the PC computer. Interface boxes have the following characteristics:

- Analog Gain: 200,000
- Noise At Front End: Less than 0.3 micro-volts
- Analog Bandwidth: 0.2 Hz to 3,000 Hz
- Analog to Digital Conversion: 6 Channels, 12 Bit Accuracy
- Battery Powered: 2 AA Batteries (included)
- Isolation: 2,500 Volts
- PC connection: RS232 serial port connection, or serial to USB for WinXP
- DIMENSIONS: 190mm x 100mm x 40mm
- WEIGHT: 13.5 oz.

**LAPTOP GROUNDING WIRE AND PLUG:** Connects to case of Laptop computer to compensate for lack of Laptop power supply grounded plug.

**AC POWER ADAPTOR:** Can be used in place of the two AA batteries that are used to power the Cyberlink Interface box. Provides reverse power isolation of up to 1500 volts. Please note this AC Adaptor has special grounding, do not use other AC Adaptors as they will produce poor brainfingering signals and may damage Interface Box.

## **OPTIONAL EQUIPMENT**

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**SENSORS:** Additional sensors are available.

**HEADBAND WITH ELASTIC:** Uses a thin elastic band around back of head, use when head movement causes sensors to move on forehead.

**EXTERNAL SWITCH CONNECTOR:** This connector allows connection of an external switch to the back of the Cyberlink Interface Box. In this way external switch can be used for clicking while Cyberlink signals can be used for mouse cursor movement.

**TWO-PLAYER SYSTEM:** This package includes a second Interface Box, Headband and a special cable for connecting two Cyberlink Systems together and software for setup and playing of two-player video games.

## **PRODUCT REQUIREMENTS**

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### **Computer Requirements**

- a) Operating system - WINDOWS 98 /Me/NT/2000/XP.  
Windows XP is recommended.
- b) Memory - - Approximately 20 MB hard drive space.

### **Interface Box Power Requirements**

Two AA Batteries (included)

### **Interface AC Adaptor**

This adaptor has 1500 reverse voltage protection and can be used in place of the two AA Batteries. It works with 110 Volts, 60 Hz power. A universal 100-240 volt AC Adaptor is also available.

## • Hardware Hookup

### 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
- 1) 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.

### Using the 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 very 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*

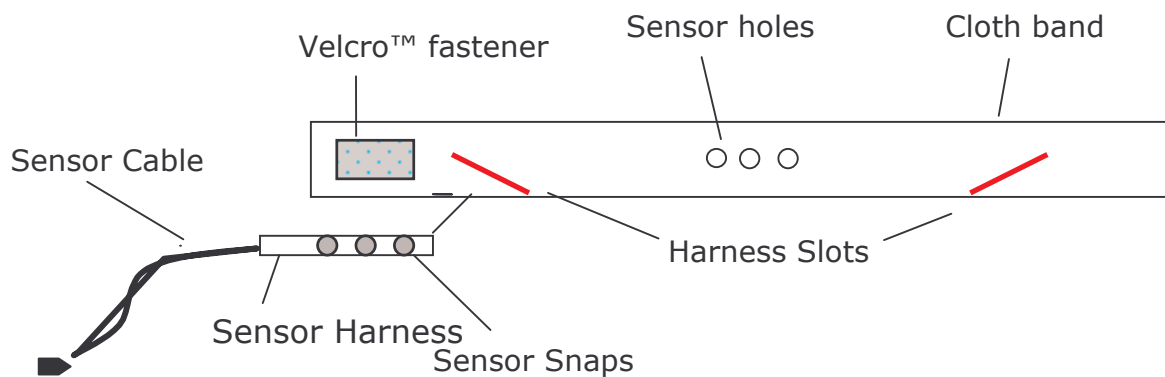
- iii. Contact Support to order new sensors
- 1) Turn the sensors while applying pressure to reinstall them into the sensor holders

Once your hardware is setup and headband is connected, go to Brainfingers Software (page 15) to read about how to begin using Cyberlink Brainfingers software. More detailed information on working with the Headband follows.

## • Headband Details

### Working with the Headband

**CAUTION:** The Sensor snap connections were designed to be very tight to insure good electrical connection. To remove a Sensor, place thumb between Sensor and cloth band. Place thumb under Sensor far enough in that you feel the Sensor holder of the Harness. Turn Sensor while applying a gentle pressure with your thumb to Sensor holder. This will allow the Sensor to unsnap from the Sensor holder. If Sensor is pulled from Headband without applying thumb pressure and twisting it is possible to damage Sensor holder.



If you take Headband apart to wash the cloth band, to swap cable sides, or replace Harness follow the procedure below to reassemble:

1. While holding Headband with the three Sensor holes facing you, slide the Sensor Harness into the slot on the desired side of the Headband
2. Work it into the Headband, as you would a drawstring in sweat pants, until the Sensor Holders in Sensor Harness line-up with Sensor holes in the Headband [as shown]:
3. Gently snap-in the three Sensors through the Headband Sensor holes into the Harness Sensor holders. Turn sensor as you press it into the harness to facilitate it snapping into the sensor.

**IMPORTANT:** Position the Dry Sensors by rotating them until the arrows inscribed on their inside surface (the side facing into the Headband) are

pointing upward or downward. When positioned properly, the faint lines (mold parting line) on the surfaces of the three sensors that touch the forehead will be in-line. This will insure that the curvatures of the three sensors are properly oriented

## Connecting the Headband

a) First apply a **VERY** small amount of CYBERGEL to one of the Dry Sensors or your finger and spread it onto the three sensors. There is no advantage to using any more than just a dab. You can rub any excess into your skin as you would a moisturizing gel; CYBERGEL is completely non-toxic and hypoallergenic. The CYBERGEL will moisturize the skin coming in contact with the sensors, thereby assuring a good connection with the Cyberlink. Do not apply the CYBERGEL if using the special Gel Sensors. They already contain a special conductive hydro-gel.

b) Place the Headband around your head so that the middle Sensor rests on the center of your forehead approximately 1/4 to 1/2 inch (1 to 2 cm) above your eyebrows. **Make Sure** sensors are pointed with their arrows up or down. Arrows are on back of each sensor. When arrows are pointing up or down, a faint line on the front of each sensor will be running horizontally.

c) Fasten the 'hook and loop' fasteners in the back so that the Headband is snug and secure but not too tight. The headband should feel comfortable on your forehead.

d) If you wish to have the Headband cable on the other side, follow the instructions on the previous page for disassembling and reassembling the Headband with the Sensor Harness inserted in the side desired.

## Assisting Others

To assist someone else in using the Cyberlink, follow these steps:

1) Carefully fasten the Headband around the user's head with the middle electrode on the center of their forehead, approximately 1/4 inch above their eyebrows.

2) Adjust the headband so that it is secure, but not too tight.

- 3) Don't allow the Headband Cable to rest directly on top of any running electric motors (in the user's wheelchair, for example). While perfectly safe, it may cause some 'noise' to be reflected on the computer screen and affect user control of the Cyberlink software.
- 4) It is possible to suspend or pause functioning of Brainfingert control if you have to performing such things as suctioning. This is accomplished by pressing Ctrl-F12 to toggle Brainfingert computer control on and off.
- 5) If the person you are assisting has uncontrolled head movements, these head movements may cause the headband to shift as they move the back of their head against a chair head rest for example. If this is the case we recommend you make use of our elastic strap headband. If you want to order this headband please contact us.

## **Routine Headband Maintenance**

The Headband is relatively maintenance free. However, the connections between the plastic sensors and sensor holders need some attention. Each of the three plastic sensors has a plastic shaft with a round ball at the end. This shaft fits inside the sensor holder. Each sensor holder has two parallel stainless steel springs that hold the sensor shaft in place. A good connection between the sensor holder and sensor shaft must be maintained to insure that a good signal is being obtained from the forehead.

To insure that the connection is maintained it is necessary to remove the sensors from headband, clean the sensors and sensor holder sockets with alcohol, and re-insert sensors into headband. If the headband is used every day this should be done once a month or sooner if the responsiveness of the Cyberlink does not feel right.

If the Cyberlink is used every day for many hours then it is a good idea to replace the sensors every three months. Harness may need to be replaced depending upon its use. With proper care Harness will usually last at least one year or longer. Additional sensors and harness can be obtained from us; email or call at support@brainfingers.com or 937-767-2674.

# • Brainfingers Software

## Software Installation

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- 1) Close all applications on your computer.
- 2) Insert CD labeled "Brainfingers" into computer.
- 3) Follow installation instructions

Two shortcuts will be added to your desktop; **Brainfingers** and **Launch**.

## Running the Brainfingers Software

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- 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**

## Auto-Adjustment Window

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The yellow line that you see corresponds to your B11 muscle brainfinger and goes up and down in respond 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 Base Value is due to you or the hardware AC noise. Follow Auto-Adjust Help screens to work with problem.

Note: If you can't at first, 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* (page 11)
- i. 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* (page 10)
- i. 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.
- i. 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*, (page 11)
  - c. Sensor harness may have failed, in which case please contact Support for help

## Brainfingers Display Window

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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.

## Brainfinger Adjustments

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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.

- 1) **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".

## Additional Brainfingers Practice

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The following two games are designed to increase your awareness of and augment your control of your brainfingers.

### Brain Billiards Game

Click on **Brainfinger Practice** and then **Brain Billiards** to go to the Billiards Game. Here you can practice moving the 10 brainwave brainfingers up and down with the task of hitting a white cue ball as it moves across the screen. The menu choices include **Adjustments** and **Game Options**. Don't hesitate to

explore the various adjustment and options choices. Remember that the left three balls (in blue) are sensitive to lateral eye movements and blinking, the center three balls are sensitive to Alpha brainwaves and eye movements and blinking, and the right four balls are sensitive to Beta brainwaves and muscle.

## Brain Candy

This window provides a fun visual experience for practicing control of brainfingers. We originally created this program for a Discovery Channel program called Super Hero Science. The Brainfingers segment of the show is included on the install CD or can be downloaded from our website at [www.brainfingers.com/media](http://www.brainfingers.com/media).

It is fun to use and is a wonderful way to learn brainwave control. It represents a wonderful pathway for learning to get in touch with our more subtle brain-body connections.

Increase your speed in Brain Candy by raising the yellow bar (B11) in the bottom right of the screen (tensing your facial muscles). Slow down by lowering 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 Practice

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Select **Click Practice** to go to windows to learn to use your brainfingers for Clicking. Any one of the 11 brainfingers can be used for clicking. The choice of what brainfinger to use for clicking should depend upon your personal preference and special needs. The program defaults to using B11 muscle as

the click control as it provides the fastest, most reliable, and most easily executed clicking for most users.

## 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 brainfingert line (B11) after making adjustments, proceed to the next exercise anyway.

6) Select **Close** when you are finished

If after making adjustments in the **Click Signal Adjust** window you find you create false clicks when you click, go to **Compensate for False Clicks** to adjust such things as **Release Time** which can compensate for unwanted repeated clicking and **Accept Time** which is the minimum time width for a click.

If you involuntarily produce more than one click when in fact you are attempting to produce just one, then increase your **Release Time**. This is the time the software will wait once a click occurs. During this waiting time the software will ignore further clicking.

If you can create a desired click, but the presence of involuntary activity causes spikes or short pulses that result in false clicks try setting the **Accept Time** to some value greater than 0.01 sec. The Brainfingers software will only register a Click if your Click signal goes above and stays above the Click Line for at least the **Accept Time**. If intended Click signals can be held above the Click Line for a time longer than the **Accept Time** then the shorter unintended signals will be ignored.

In addition to using a brainfingert to create a simple click for mouse clicking and keyboard character triggering it is possible to make four other timed clicks with the same brainfingert. These timed clicks are defined as Timed Click 1, Timed Click 2, Timed Click 3 and Timed Click 4. To trigger timed clicks you must hold your Click signal above the Click Line for a time greater than the time set for the Timed Click. For B11, a moderate closing or clenching of the Jaw can be used to keep your click signal above the Click Line. The default minimum Click times are:

Timed Click 1 = 0.3 sec

Timed Click 2 = 0.6 sec

Timed Click 3 = 0.9 sec

Timed Click 4 = 1.2 sec

To change these Timed Click times go to **Adjustments** and select **Timed Clicks**.

For some users the **B11** muscle brainfinger can not be controlled successfully to produce consistent clicking. In this case it will be necessary to make use of one of the other brainfingers. Go to **Adjustments** and **Brainfinger Selection** to choose one of the other Brainfingers to practice Brainfinger clicking.

If you want to use left or right eye glance as the click control, select brainfinger **B1**, **B2** or **B3**. **B3** is processed slightly faster than **B1** and **B2**; you might want to start with this brainfinger for clicking if it is responsive enough. Be cautious with using eye movements for clicking. The repetitive nature of moving one's eyes laterally may cause a strain. Set Amplify as high as possible while still providing desired control.

If **B11** muscle won't work as a control we recommend learning to control one of your Beta brainfingers such as **B7**. But to learn Beta brainwave control we recommend you start by learning to achieve an Alpha state or feeling. Once you have this feeling you can move into it as a way to bring your Beta brainfinger down in preparation for your next Beta Switch. You can practice and play with learning Alpha and Beta control in the **Brainfingers** window, in a **Brain Billiards** and in **Brain Candy**. Under **Switch Practice** additional games are provided to help you learn to trigger switches with your brainfingers. They are discussed below.

## 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

- 1) Select **Stop** if you would like to pause the game and **Close** to exit
- 2)

### **Typing Practice Window in Switch Scanning Mode**

Use this window to practice working with an on-screen keyboard in a scanning-switch mode. There are three keyboards available for practice at this time.

The **Typing** program is a simple on-screen typing program, which allows the user to practice scan and clicking skills. Click to select characters on a virtual keyboard. The yellow selection window steps from possible selection to possible selection. When the yellow box highlights the desired selection, a brainfingert click selects the highlighted selection. The rate of scanning is determined by the Stepping Time. Go to **Adjustments** and **Scanning** to change Stepping Time.

## Mouse Practice

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From the main **Brainfingers** window, select **Mouse Practice** to access the various mouse practice windows. Once the pull down menu appears select one of the practice windows.

### Grow Game

Brainfingert 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:**

- c. Amplify more if you would like to increase the range of the box's movement. This will increase the responsiveness of the box movement.
  - d. Amplify less if you would like to make the brainfinger and box movement less sensitive.
4. Select **Apply** to keep changes
  5. Continue playing by selecting **Start** and adjust as needed
- 1) Once you are able to control B11, select **Stop Game**
  - 2) Select **Axis to Control**
  - 3) Select **Left/Right**, the left/right axis is automatically configured to be controlled by B2 (left/right glance).
  - 4) 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.
  - 5) 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.

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

Up/down control defaults to **B11** muscle control. If you find **B11** is not a good control then change to a different Brainfinger for control by selecting **Adjustments** and **Brainfinger Selection**.

## 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. Pong allows you to experience and practice a refined, subtle and efficient use of your brainfinger controls. If you are using **B11** facial muscle for up/down paddle control, try to move the paddle up without lifting your eyebrows. Instead try to expand your temples at the sides of your head. Another way to say this is to try to expand or contract your muscles at the side of your head. At first this may sound strange. But after a while it will be easy to create the slight muscle signal needed at the forehead without moving your eyebrows. In this way forehead movement from eyebrow lifts will be reserved for clicking and more subtle facial muscle activity will be reserved for paddle, joystick and cursor control.

- 2) Select **Mouse Practice** from the tool bar
- 3) Select **Pong**
- 4) Select **Start Game**. Movement along up/down axis is controlled by **B11**. You get to control left paddle, computer controls right paddle.

### *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:**

- c. Amplify more if you would like to increase the range of the paddle's movement.  
Amplify less if you want paddle to fluctuate less.
4. Continue playing by selecting **Start** and adjust as needed
- 5) Select **Stop** when you are ready to proceed to Left/Right Practice
  - 6) Select **Axis to Control** from the tool bar
  - 7) Select **Left/Right**
  - 8) 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 **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.
- 9) 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
1. Select **Okay**
2. Select **Start Game** to resume game with adjusted settings
- 3.

## Two-Axis Setup Window

After you are comfortable with control of each axis separately you are ready for Two-Axis Cursor Control. From the **Mouse Practice** menu select **Two Axis Setup**.

If you can raise the cursor up on the vertical axis while maintaining a fairly stable position on the horizontal, then the Up/Down adjustments are good. If the cursor seems to get stuck in the up position, then lowering the Shift adjustment may overcome this problem. You can also try lowering Amplify but we recommend you try working with Shift first.

**If moving the cursor up** also tends to result in movement of the cursor to the right, you may want to increase the Up/Down Amplify adjustment. Movement to the right when you are trying to only move up usually means that you are “**pushing**” too much in the up axis and the control signal is spilling over to the right axis. Reducing the Right/Left Shift adjustment may also reduce the interaction of right movement with up movement. Note: fatigue can have the effect of reducing your ability to move up independently of right.

Most users find that **B11** brainfnger is the best way to control the up/down motion of the cursor. Any increased muscle activity at the forehead will cause the cursor to go up. Raising the eyebrows is usually the first technique a new Cyberlink user employs to bring the cursor up. **However, do not use this technique!** Although this technique will work, it has

drawbacks that can make overall mouse cursor control a problem. When you raise your eyebrows two things can happen. The contraction of the eyebrow muscles will produce an increase in voltage at the forehead, which is the desired effect but the signal is usually too strong. Secondly, raising the eyebrows can also cause the surface of the forehead to contract, which will cause the connection with the headband sensors to change. This change in surface contact between headband sensors and forehead skin can produce a huge and unpredictable change in the electrical signal that the Cyberlink detects. Thus eyebrow lifts usually result in an excessive upward movement as well as unexpected rightward movement.

To avoid unwanted rightward cursor movement it is recommended that you practice creating a facial muscle action at the forehead that does not depend upon raising your eyebrows. This can be accomplished by moving the outer edges of your eyebrows near your ears, actually muscles at the temples, out and back towards your ears and then up at the same time, while keeping the rest of your eyebrows still. Once you get this technique to work you will be amazed at how easy it is to use this action to move the cursor up in a more subtle and controlled way, without creating unwanted rightward movement.

Once you have Up/Down adjustments to your liking, adjust Left/Right. First adjust Shift so the cursor slides back to the left when you keep your eyes still and relaxed. Changing your shift value changes the resting position of the cursor more to the right or left. Adjust Amplify so you can cause the cursor to move to the right using modest eye glances to the right. Increase the Amplify if you find that your quick rightward glance to move the cursor right does not move the cursor rightward enough.

**IMPORTANT:** During the course of using the Cyberlink you may find, while trying to raise the Cursor, the cursor sails over to the right and gets stuck there. A possible explanation for this is the presence of excessive CYBERGEL or perspiration. If so, wipe off excess gel or moisture, refit the Headband, and change your right/left biasing value as required restoring full right/left cursor control. Always keep in mind that every once in a while (perhaps every three or 4 weeks) it is a good idea to clean the sensor/sensor holder connections (refer to *Headband Maintenance* in this manual).

## Changing Axis Mapping

When you run the software for the first time Up/Down Control will default to brainfinger **B11**. This control is sensitive to gentle forehead muscle activation and relaxation. Right/Left control defaults to **B2**. **B2** control is accomplished with a rapid eye gaze to the right and back. We have found this combination is well suited for intuitive control and fast learning for many users.

These settings do not work for all users, thus it is important to know how to change axis mappings to other brainfingers. If you are unable to use **B11** to achieve the desired up/down action then we recommend you work with one of the brainwave brainfingers such as **B7** or perhaps **B6** for vertical control. Users have had success with **B2** for Horizontal and **B7** for Vertical control. Learning Vertical control with **B6** is also an option. Some users are successful with **B6** for vertical, **B2** for horizontal control and **B6** for clicking. If you use brainwave brainfingers it is valuable to learn the Alpha state.

The **B11** control may not be appropriate initially for users with excessive involuntary muscle contractions. For these users, we would recommend training with a different vertical control such as Brainfinger **B9** before attempting **B11** brainfinger vertical control. Learn the Alpha state also to get a body sense of what it means to relax.

Brainfingers is easily configurable, thus we encourage you to experiment with different axis control mappings. The **B11** brainfinger for vertical control is very stable and accurate to use, yet it is also very sensitive to voltage present at the forehead from unconscious facial muscle holding. Thus the choice of other brainfingers may be indicated.

Mapping of brainfinger to axis control can be accomplished by selecting **Adjustments** and then **Brainfinger Selection**.

## Add Glance Left/Right Control

Using left and right glance allows horizontal movement of the cursor by simply glancing left and back to center to move the cursor left and glancing right and back to center to move the cursor right. This control paradigm is available in Brainfingers and Launch programs. To use Left/Right Glance control you must be able to execute consistent left and right glance

movements. This control option is turned on by going to **Adjustments** and then **Brainfinger Selection**.

## Adding HUD to Highlight Cursor

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.

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

## The Labyrinths

When you are confident with your adjustment settings and ability to move the Two-Axis cursor around in the direction(s) you intended, select one of the two Labyrinths to practice and refine your skills. Do the **Easy Maze** first, then the [not-so-easy] **Labyrinth**.

### Easy Maze

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.

## **Labyrinth Game**

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

## **Mouse Setup and Practice Window**

Here you can practice moving the cursor around the screen combined with triggering mouse button events. You can also practice using Switch2 for changing the speed of the cursor. Each time you cause a Switch2 you will

toggle from slow speed to normal cursor speed or from normal cursor speed to slow speed.

Practice moving the cursor without causing a Switch. If whenever you try to raise the cursor you also tend to get unintentional triggering of switches, your switch adjustments of Shift and Amplify may need to be lowered or your cursor signal Shift or Amplify may need to be increased. Experiment with the various adjustments to find what works best for you.

Before changing your switch adjustment it is recommended that you work with the up/down adjustment. Try to adjust up/down Signal so that it takes only a subtle effort to raise the cursor. You may also try increasing the cursor Amplify adjustment in the up/down axis so that control requires less effort to raise the cursor and thus less possibility for a click.

## Cellar, Tetris and Acquire Games

These games have been provided for practicing moving the mouse and for triggering left mouse button events. Setup your desired control profile in **Mouse Setup** before going to **Tetris** and **Cellar**. **Tetris** is challenging and fun. In **Tetris**; Left/Right mouse cursor control moves the pieces left and right, Switch1 rotates the pieces and a Switch2 drops the pieces.

**Cellar** is a fun game that also allows you to practice moving a cursor. Switch1 allows you to pick up bottles, open a safe etc. Switch2 allows you to toggle the speed of the cursor between slow and normal speed.

**Acquire** allows you to practice pointing and Switching as well as pointing and touching random appearing targets. Performance scores are provided to give quantitative measurements.

## Typing Practice Window in Direct Select Mode

To practice using Point and Click to type go to **Typing (Point/Click Keyboard)** to go to the Typing Practice screen. There are three keyboards available for practice at this time. All three keyboards can be controlled with mouse point/click. A typing timer is provided to time various typing modes. See the **Help** screen in Typing.

## Hands Free Brainfingert Control

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It is possible to control Brainfingers and the Launch programs in a Hands Free mode. Click on **Hands Free** and **Hands Free On** to turn on hands free control. Note that a menu will appear, with automatic scanning through possible choices. If you cause a Switch1 when a desired choice is highlighted the software will execute this choice. If **Hands Free On** is checked and you select **Launch**, when the **Launch** window comes up it will be running in hands-free mode as well.

Click on **Hands Free** and then **Adjust...** to make changes to the Stepping Time and Scan Cycles. Stepping Time represents the time in seconds the program dwells on a possible opportunity before stepping to the next. Increasing this time allows more time to make a selection. Stepping Time adjustment is carried over to the Launch program. Set Scan Cycles to the number of times you want the software to cycle through a complete menu scan before it stops. Once scan cycles are complete the hands-free software stops and waits for you to click to start the scan cycle again.

## Data Collection: Record and Playback

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In Brain Billiards, Click Game, Pong, Easy Maze, Labyrinth, and Acquire, it is possible to record a game and play it back for review. To access this Data Collection capability click on the menu choice **Data**. This will pull down two menu choices, **Record** and **Playback**.

To collect data, instead of selecting Start, select **Record** and then **Start Recording**. A small window will appear with the words "Starting Data Collection, Please Sit Quietly". A timer will indicate an initial data collection period of 4 seconds. Once the initial period is over the game will be started and data collection will continue. Once the game has been completed the Data Recording will also be completed automatically. You can also stop the data collection at any time by clicking on **Stop** or **Record** and then **End Recording**.

When you start recording the window heading will change to indicate that a data file is being recorded. Each time you record data a unique data file is created. Each data file is stored as a text file. The format of each data file is the same. An example data file would look as follows:

Name\_Billiards\_010905084427.dat

The format contains first the name of the user, then the name of the game, then a unique numerical representation of date and time and finally the extension “.dat.” In the above example the following date is indicated: data was collected in the year 2001, on the 09<sup>th</sup> month, and on the 05<sup>th</sup> day. The time is indicated with a 24-hour clock. Thus for the example, the data was collected at 08 hour, 44 minutes and 27 seconds.

Once you have recorded a data file it is possible to play it back. To play back a file click on **Data**, then **Playback** and then **Select Data File**. A window will come up with a list of data files that have been collected and that can be played back. Click on the data file you want to playback and then click **Open**. This will cause the software to open the selected data file and present a Playback Controller at the top of the game window. The Playback Controller works much like a CD or tape player controller works. You can control the playback speed with **Pb Speed**.

# • The Launch Window

## Starting

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You can start by clicking on **Launch** in **Brainfingers** or you can click on the **Launch** shortcut icon. This will start the **Launch** program. If you start in **Brainfingers** and you are controlling the Brainfingers software in hands-free mode you can select **Launch** and continue in the **Launch** window in hands-free mode.

## Using Launch

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The opening Launch window includes launch buttons that you click on to launch onto your desktop and to control third party software. The key to the way you interface with your desktop and third party software is determined by how the launch buttons are configured. Within the launch buttons are specified what brainfingers you will use for switching selected mouse and keyboard events.

Menu options are included to support the setting up of your brainfingers for interfacing with your computer. Under **Users** you specify what user is to be selected for control of the computer with their brainfingers. Under **Launch Wizard** you can create/edit/delete launch buttons, the key between you and your computer via brainfingers. Under **Click Practice** you can practice triggering switches with the various brainfingers to select the best Switch signal for desktop/third party control. Under **Mouse Practice** you can practice mouse control in preparation for launching onto your desktop. Select **Hands Free** to turn on and off hands-free control as well as adjust stepping time and scan cycles. **Help** provides you with access to a number of help screens with helpful hints of how to best make use of your Cyberlink system. Selected menu choices are explained in more detail below:

### Users:

Here you can select from a list of prior users or create a new user. Once a user is created a user file is maintained for that user. Each time you make a

change in any of the user's adjustment values they are saved in a file called c:\Program Files\Brainfingert\cybutil.ini. The software will allow a total of 20 users at one time.

If you are a caregiver working with someone with a severe disability and you are not sure of how easy it is for the individual with the disability to control their computer based upon the settings you have chosen it is recommended that you put on the headband and try it yourself. Actually control brainfingers with the user's settings and experience what it might feel like for them. In setting up a user with brainfingers it is important that consistent access be achieved and it is also important that the interface be as easy to control as possible, be as sensitive as possible and require the least amount of effort as possible.

## **Launch Wizard:**

The Launch Wizard is the key to creating the appropriate interface between you and the computer. The Wizard steps you through the process of creating a new launch button, editing an existing launch button and deleting unwanted launch buttons. At each step in the launch process you are presented with choices to make to achieve the desired interface.

You can use the Wizard to create a new launch button. If you follow this path you will be able to choose from a list of predefined launch buttons or start with a new button. You can use the predefined buttons as templates to create and customize your own buttons.

You can use the Wizard to edit existing launch buttons. Here you will select one of the already created buttons. You can use one of the existing buttons as a template to create other buttons. Simply change the name of the button and proceed. The Wizard will ask if you want to save the generated button as a new one or as a replacement.

You can use the Wizard to delete existing launch buttons. Again follow directions in the Wizard.

At each step in the Wizard process guidance is provided as to what choices to make and what each option means.

## Click Practice:

Here you can practice using a brainfinger for clicking. Use this window to access adjustments to Shift, Smooth and Amplify as well as compensation times. This window will also give you an opportunity to play with and adjust the timed clicks.

Practice controlling a simple click, timed clicks and mouse button clicks. Left and right mouse button clicks are generated by using simple click sequences. One simple click = left button click, two = left double click, three = left click and drag, and four = right button click. You can practice multiple clicking in the Click Practice window as well as in the Mouse Practice window.

By clicking your brainfinger the proper number of times in sequence, you create the desired mouse button event. For example, to achieve a click and drag you would do three brainfinger clicks. The times between each of the three clicks must be fast enough so the software considers the three click actions to be part of a series. If the time is too long between brainfinger clicks then the software will translate the clicks into separate single left mouse clicks.

The maximum allowable time between brainfinger clicks to be considered part of a click series is defined as the Repeat Time. To adjust go to **Adjustments** then select **Mouse Clicks**.

The default value for **B11** muscle clicks is 1.0 seconds. If you find that you are creating only single clicks when you intend to create multiple mouse clicks increase this time value.

Mouse button clicks can also be practiced in the Mouse Practice window.

## Mouse Practice:

Here you can practice moving the cursor around and integrating cursor movement with Clicking. Here simple clicks in a series create mouse clicks and timed click 1 can be used to toggle cursor speed change.

If using **B11** for vertical control, increasing mental intensity or subtle forehead or other facial muscles contractions will raise the cursor up on the

vertical (Y) axis and glancing briskly to the right and back will move the cursor to the right on the horizontal (X) axis. This assumes you use the default settings of **B11** muscle for vertical and **B2** lateral eye movement for horizontal control.

Most users find that **B11** is the best way to control the up/down motion of the cursor. Any increased muscle activity at the forehead will cause the cursor to go up. Raising the eyebrows is usually the technique a new Cyberlink user employs to bring the cursor up. Although this technique will work, it has possible problems that can make overall mouse cursor control difficult and unpredictable. When you raise your eyebrows two things can happen. The contraction of the eyebrow muscles will produce an increase in voltage at the forehead, which is the desired effect. Unfortunately, raising the eyebrows can also cause the surface of the forehead to contract, which will cause the connection with the headband sensors to change. This change in surface contact between headband sensors and forehead can produce a huge and unpredictable change in the electrical signal that the Cyberlink detects. This can result in an unexpected rightward as well as an intended upward cursor movement.

To avoid unwanted rightward cursor movement it is recommended that you practice creating a muscle action at the forehead that does not depend upon raising your eyebrows. This can be accomplished by moving the ends of your eyebrows near your ears, temple muscles, out and back towards your ears and then up at the same time, while keeping the rest of your eyebrows, the fronts, still. Once you get this technique to work you will be amazed at how easy it is to use this action to move the cursor up without creating unwanted rightward movement.

PLEASE NOTE: When you perform a brisk leftward glance (look quickly to the left and then forward) or rightward glance, the resulting eye motion will send the Cursor to the right. As in other Cyberlink Programs, to move the cursor left you must relax your eyes. One of the easiest ways to accomplish relaxed eyes is to keep your eyes on the cursor.

You can practice using **Timed Click1** to toggle between fast and slow cursor speed. This is useful when working on desktop. As you bring the cursor close to a target (icon, button on a control bar, etc.), especially if it is a small one, switch to slow speed. This will give you the accuracy you'll need to reach small targets without overshooting. Return back to fast mode with

a second **Timed Click1** when you want to move the cursor rapidly to another area of the screen.

Under the menu option **Adjustments** you will find selections called **Cursor Speed** and **Cursor Motion Profile**. Use these windows to adjust the cursor behavior to better suit your needs. You will be adjusting speed of cursor and the characteristics of Auto Drop. Auto Drop refers to the action of the cursor when you lower your up/down or right/left control signal (whether it is brainfinger **B2**, **B7**, or **B11** for example) to a level that would allow leftward or downward movement of the cursor. In Auto Drop Mode leftward and downward movement is automatically controlled in duration and speed.

The **Direction Reversal Pause** refers to the time that the cursor pauses or holds still once you change to a leftward or downward direction. This pause provides stability and accuracy to cursor activity.

The **Boost Speed** provides an increase in downward and leftward cursor speed once Normal Time has exceeded. This capability will allow you to simultaneously have fine cursor control and speed when needed to traverse large distances quickly on the desktop.

Rightward/Upward **Cursor Speed** can also be adjusted in **Auto-Drop Adjustments**. Increase or decrease the rightward/upward cursor speed as desired to achieve faster cursor motion and response or slower, more stable cursor motion and response, respectively.

If you set the **Rightward Shelf Switch** value to on, movement to right will prevent dropping. Users report more stable mouse control with this Switch option set, especially if working with pull-down menus

We recommend that you experiment with these options once you have become familiar with brainfinger up/down and left/right cursor control. These options must be set for a user in the Mouse Practice window. Once set these adjustments will carry over when you launch onto your desktop and control 3<sup>rd</sup> party software.

## **Putting Launch Pod in Pause Mode**

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When you select a Launch Button and then launch it you will be controlling desktop and other programs through a small program called the **Launch Pod**.

There will be times when you will want to stop the **Launch Pod** from responding, without having to return to the **Launch** window. Also there are times when a Caregiver will want to put brainfingers in pause mode during aspiration of a ventilator for example. The following methods are available within the Wizard Launch Button setup process.

You can use one of the timed Switches (Switch2-5) to toggle in and out of the pause mode. Once in pause mode the software will wait for another Switch signal to un-pause.

Launch buttons can be setup with the Wizard so that when the **Ctrl-F12** keyboard key combination is pressed the Launch Pod will go into a pause mode. It will remain inactive in this mode until another **Ctrl-F12** key combination is pressed. While in pause mode the hand mouse will remain functional. This mode is always on by default in all the launch buttons.

## **Activating a Lunch Button**

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Once you have selected a desired user name, tested your connection with Switch Practice and or Mouse Practice, and set up a desired launch button, all you have to do is select the desired launch button to go onto your desktop. The control profile you specified in the launch button with the Launch Wizard will determine how you link your brainfingers to your computer.

To return to the Launch program simply click on "LAUNCH" in the task bar. This will turn off the Launch Pod control of the desktop and bring up the Launch program.

Clicking on the **Mouse Access to Desktop** launch button will bring you to your desktop with your brainfingers controlling the cursor. Now is the time to be careful about unintended Switching of mouse click events! You will be moving the cursor around and clicking and dragging and perhaps creating havoc with your desktop. Unwanted Switching is the worst problem!

**NOTE:** Whenever you get into trouble by unintentionally Clicking on icons or Desktop controls with brainfingers you can turn off the desktop controlling **Launch Pod** by holding down the Alt key and pressing the **Tab** key until the **Launch** program is highlighted, then release **Tab** and **Alt**. Once back at the Launch Console, correct the unwanted click problem. If you are running in

Hands-Free mode you may want to select one of the timed clicks [1-4] as a way to automatically return to the launch program when you lose sensitive control (consult the Launch Wizard for ways to setup timed Switches).

Once you launch onto the desktop it is best not to do anything at first. Simply observe what is happening; do not click over icons or desktop buttons unless you mean it! You can always use the hand mouse, as it overrides brainfingering control.

The normal way to get back to the **Launch** window is by moving the mouse cursor over the Launch button on the Task Bar and performing a Click with your brainfingering, this is the preferred hands free option. You can also perform a timed click or many repeated simple clicks to bring you back to **Launch**. Turn on the repeated click return by selecting **Hands Free** and **Click Return Setup**.

Notice how easy it is or not to move the cursor around the screen. If, for example, you find the cursor seems to require too much effort to raise it above the bottom of the screen and you have to keep pushing it back up all the time, the Up/Down axis Shift or Amplify may need to be increased. To do this, return to **Mouse Practice** and apply the needed readjustments. Once you feel like you have conscious control, you are ready to launch! You may want to go back to Brainfingers from time to time to play and practice control in the various windows.

## Adding Applications, the Launch Wizard

The Launch Wizard is your key to creating launch buttons that will allow you to interact with third party software. One of the things you can do with a launch button is start up a third party software program when you select a launch button to run. To do this you will need to specify the executable path for the application. For example if you wanted to use Wivik the executable path would be:

C:\Wivik\Wivik.exe

In many cases we find it is easier to first start the application and have it running, and waiting for inputs. Then simply launch the appropriate launch button and your brainfingers you will control the application.

Below we provide a few comments about creating launch buttons for some on-screen keyboards:

*1) Words Plus EZKeys* – This program works quite well with brainfingers switches in Scanning mode. At this point the XP version does not allow mouse control only scanning. Words Plus has modified their software to work with the Cyberlink. The XP and Win98/95 versions work quite well with the Cyberlink. It is possible to now use up to three switches by using Switch1, Switch2 and Switch3 for the control of EZKeys.

To use Brainfingers with EZKeys under Windows 98/95 you must use Words+ EZKeys software version 2.54 or newer. You must use version 3.05 Beta or newer for Windows XP. Software updates are available free of charge from Words+. The Brainfingers Install CD also has EZKeys update programs. These update programs must replace older Ezkeys programs for brainfingers to control Ezkeys. The EZKeysXP.exe update can only update EzkeysXP version 3.02 or newer. If you have an older version you will have to get an update from Words +.

Use the Launch Wizard to create an EZKeys launch button. An EZKeys template is included. Note, EZKeys must already be running when you select and run the EZKeys launch button. Place an EZKeys shortcut into your start up menu so it is started when your computer is turned on. This way EZKeys will be sure to be running when you launch to control EZKeys. To return to the Launch window from EZKeys to make user adjustments use the radar mouse to click in the Task bar on LAUNCH to bring up the Launch window.

Within the Wizard it is possible to set up one of the timed Switches to allow toggling between EzKeys in Switch Scanning for text entry and full mouse mode. Using a brainfingers to control switch scanning of EzKeys is often a faster way to enter text than using brainfingers for pointing and clicking an on-screen keyboard. It is possible to use a brainfingers in switch scanning to enter text and be able to toggle from the switch scanning Launch Button to a full mouse control Launch Button to move around the desktop. This is a nice way to both surf the net and enter text. When you toggle to Mouse Control from EzKeys Switch Scanning the brainfingers controlled switch stops sending commands to EzKeys.

In the mode of toggling between switch scanning of Ezkeys and brainfingert mouse control it is a good idea to go into Ezkeys and then select Design, and Scan Box Design and then check Hide scanner when done. Then when you go to Mouse Control the Ezkeys scanner box will hide from the screen.

2) **Clicker 4** - an on-screen keyboard that speaks (with the WINDOWS Voice Synthesizer) and sends key strokes (letters, words and phrases) to any program you specify. The executable path is normally:

C:\Click4\Clicker 4.exe

The Wizard includes a predefined template for Clicker 4. You can use this template to create a Clicker 4 launch button. Once created if you select the Clicker 4 button you will launch onto the desktop and Clicker 4 should automatically start up. When you perform a Switch1, a left arrow keyboard event will be generated. Once set up for this input, Clicker 4 will respond to this left arrow key press.

Within Clicker 4, setup so that a brainfingert can trigger Left arrow key, go to Clicker 4 'Options' and then select 'User Access'. Then under 'Access Method' select 'Single Switch'. Under 'Switch Connection' select 'Up and left arrow keys'.

Please note that Clicker may have come out with a newer version of their software and the above information may be incorrect.

3) **Wivik** - an on-screen keyboard with Expandable Keyboard and Word-Prediction options. A predefined template for Wivik is included in the Wizard. It is only setup for one switch control at this point. Wivik can respond to two switch input as well. If you want you can set up two switch input. In this case use Switch 1 to select and Switch 2 to escape as the two switch controls. Setup the two switches (Switch1 and Switch2) to trigger F11 and F12 keyboard events.

When controlling an on-screen keyboard like Wivik it important to be able to use the Launch program to launch the on-screen keyboard and be able to go back to the Launch program in a hands-free mode. In this way the user can make changes to their settings and launch other programs if desired.

Wivik does not come with a way for the user to turn off Wivik and allow return to the Launch program. Wivik does allow the user to turn off Windows however. Of course the last thing a person using brainfingers in hands-free mode wants to do is turn off Windows, but they will want the ability to turn off Wivik and return to the Launch program. This can be done quite easily if you make a change to the particular keyboard layout that you are using in Wivik. What you will do is change the Macro key that is "ExitWindows" to have the function of only turning off Wivik. Then when selected in the scan/click mode, Wivik will turn off and the Launch program will come back up.

To change the desired Wivik keyboard layout, use Explorer to go to c:\wivik\macro and open this folder. This will provide a list of all the Wivik keyboards. Double click on the desired keyboard to change. Notepad will be started and will open the keyboard file. For example you might want to change ctrfreq2.kbm. Once the file is opened click on Search and then Find. Enter <QuiteWindows(0)> as the thing to search on. Once you have found this text, replace it with <QuiteSelf(0)>. There are usually two entries in each .kbm file to be changed. Once you have made the changes, close the window and save changes.

**4) *IntelliTools*** – We have tested the control of Intelli-tools with brainfingers and found that the two work well together in switch scanning and mouse control modes.

**5) *Commercial Educational Software*** – We and others have found brainfingers works great with 3<sup>rd</sup> party software like Reader Rabbit etc.

**6) *Direct Selection using Cyberlink for Clicking, SmartNav head-tracker for pointing and the Reach Keyboard*** – We and others have found that this combination is a great way to do direct selection of a keyboard if you have good head movement. The beauty of using the Cyberlink for clicking is the stress that normally comes with using dwell selection is eliminated. The Reach keyboard with its smart keys makes workload less as well.

## • Appendix A

### For Further Information

1) For information about biofeedback, altered states of consciousness, and the Brain-Body signal write:

Brain-Body Research Project  
1350 President St.  
Yellow Springs, OH 45387  
or e-mail: [admin@brainfingers.com](mailto:admin@brainfingers.com)

2) For more specific information about Cyberlink system calibration, adjustment, or other software related questions write:

Software Support Dept.  
1350 President St.  
Yellow Springs, OH 45387  
or call: (937) 767-2674  
e-mail: [support@brainfingers.com](mailto:support@brainfingers.com)

## • Appendix B

### Glossary

Alpha Waves - medium frequency bands (approximately 7 - 12 Hz) of the EEG or ElectroEncephaloGraphic spectrum (brain component of the BrainBody signal). High average energy levels in these frequency bands are often associated with a meditative or hypnogogic state and/or a relaxed, unfocused state of attention. In the Brainfingers display they correspond to the three middle, green Brainfingers.

Alpha State - associated with a decrease and quieting of the muscle brainfinger B11, a quieting of the lateral eye movement brainfingers B1-B3, a decrease in the Beta brainwave brainfingers B7-B10, and an increase in the Alpha brainwave brainfingers B4-B6. Getting into this state is facilitated by relaxing one's neck muscles, sitting in a relaxed and straight posture, creating a feeling of openness and extension along one's spine, breathing

into one's belly and creating a feeling of quietness in one's mind. It has been compared to a feeling of coming home or back into one's body.

B.A.T., Inc. - Brain Actuated Technologies, Incorporated, makers of fine hands-free control interfaces and drivers.

Beta Waves - high frequency bands (approximately 12 - 35 Hz) of the EEG spectrum (brain component of the BrainBody signal). Elevated or agitated energy levels in these frequency bands are often associated with an active, alert, and focused state of attention or a high level of concentration (particularly on a cognitive/perceptual task). The four high frequency (red) brainfingers on the right side of the Brainfingers Display Panel, can be increased also by facial muscle activity.

BrainBody signal - electrical potentials detected by sensors at the forehead and resulting from both mental activity, eyeball motion, and subtle or gross facial muscle activity.

Brainfingers - the individual frequency components of the BrainBody signal. Their shifting energy levels are represented in real-time by corresponding changes in their heights in the Brainfingers Display.

## • Appendix C

### Troubleshooting

#### Possible Signal Problems

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Signal looks screwy or not 'normal'.

- a) Is the Headband on well enough?
  - i) Reapply CYBERGEL
  - ii) Are the Sensor and Sensor Holder connections clean?
  - iii) Is the Headband cable pushed all the way into the Interface Box?

- b) Are you using a Laptop computer with external power supply? Do you have the Grounding wire connected? Signal may be noisy due to poorly grounded computer. Add case grounding wire.
- c) Do you have a faulty Headband? Examine the Sensor Snaps, Harness, and Cable for any visible breaks.  
Contact us at (937) 767-2674 or E-Mail us at support@brainfingers.com if you feel you need a replacement.
- d) Change the batteries in the Cyberlink™ Interface Box.
- e) Touch the Computer casing to dissipate any static electric charge you may have picked-up from shuffling your feet on the rug, etc. Presence of Grounding strap should prevent such problems on Laptop computers.

## Poor Signal

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If you find the cursor continues to move upward or tends to stay at the top of the screen using B11 muscle control, no matter how much you relax your forehead, you may be having trouble because of poor signal quality. This can be due to static build-up on your body, a poor connection at the headband, the headband sensors need to be replaced or you are using a Laptop/Notebook computer and it needs a grounding strap.

**IMPORTANT:** If using a Laptop/Notebook computer, only adjust after you have added the grounding wire to computer case. Adding the grounding wire may be all that is necessary to fix a problem of static buildup! Static buildup on Desktop computers is very uncommon for the Cyberlink Brainfingers system.

If after adding a grounding strap you still have a poor signal it may be that even though you are connected to a plug with a proper ground connection the plug itself may not be properly grounded. Again contact us if you need help.

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Brain Actuated Technologies, Inc.  
1350 President Street  
Yellow Springs, Ohio 45387 USA  
Tel: 937-767-2674 Fax: 937-767-7366  
[www.brainfingers.com](http://www.brainfingers.com)

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**Bringing the Gift of Hands-free Access to the World**