Training Tutorial for Individuals with ALS

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Introduction

The following Tutorial comes as a result of working with individuals with ALS. We found we could divide individuals into one of two groups base upon their abilities to control brainfingers.

Level 1 Control: Individuals with little to no eye control and little to no facial muscle control. These individuals were unable to successfully control their facial muscles. For these individuals an alternative approach using brainwaves was developed.

Level 2 Control: Individuals with restricted facial muscle control or who had lost control of their hands and legs, but still retained control of their eyes and facial muscles. In these individuals there was a tendency to use excessive facial muscle effort and they tended to over-control. For these individuals an approach, which taught more subtle facial muscle control, was developed. With training these individuals were able to use Brainfingers with almost the same performance as able-bodied individuals.

This tutorial guides you through the approaches to take as well as how to determine at what level an individual might be able to control Brainfingers.

Setup of Software and Hardware is presented first. The tutorial then guides you through starting to work with the Brainfingers software. It then presents two protocols to follow based upon the user's performance with Brainfingers. Protocols for each of the levels of possible control are presented. Each protocol is designed to help the ALS user and helper discover and implement the best control approach for the user. While going through the protocol 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.

Please first learn to use Brainfingers yourself before helping someone else. It is important to understand how it feels to use brainfingers and the relationships between adjustments and changes in brainfinger control. By doing this you will be better equipped to help others. Also, please remember that learning to use Brainfingers involves learning new motor skills. Motor skills become learned when they become automatic. This takes time.

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
- External Battery Pack (on units built after 05/06)
- 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 side left region of the Cyberlink unit and plugged into a wall outlet if you do not wish to operate on battery power. On Cyberlink systems built after 05/06, the batteries are housed in an external battery pack that plugs in to the side of the Cyberlink box, the same place the AC adaptor can be plugged into.

   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. If the user has moist skin gel may not be needed. Try without first to see if Base Values for B11 are sufficiently low without gel (see Brainfingers Auto-Adjust; page 5).

3) Center sensors in the middle of 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 or alcohol.
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@brainfingers.com to order new sensors

3) Turn the sensors while applying pressure to reinstall them into the sensor holders

Getting Started with the Brainfingers Software

Introduction

For this Getting Started section we assume you are running first as an able-bodied user to learn functionality of the hardware and software and experience what it is like to control your brainfingers.

Running the Brainfingers Software

1) Make sure Headband is secured to head and plugged into Cyberlink Unit, and that Cyberlink Unit is properly connected to computer.

2) Double click on the Brainfingers icon on desktop or go to the 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 user name. Type name of 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 B11 muscle brainfinger and goes up and down in respond to facial muscle tension and facial relaxation. During the Auto-Adjustment process it is important to keep the yellow line as close to the green base line as possible. Relaxing facial muscles does this. The red line corresponds to the value for the B11 Base-Value present in the software. Once auto-adjusted the base value will represent an estimate of the average of the B11 brainfinger. The more your facial muscles are relaxed, the lower the yellow line and B11 Base-Value (red line) will be.

1) Relax facial muscles

2) Select "Start Auto-Adjust"

3) Follow the blue bar with your eyes as it scrolls across the bottom of the auto-adjustment window. When done new Base-Values will be

computed and the red line will shift up or down to indicate level of new value.

4) Notice how your yellow line moves up and down in relationship to the new red B11 Base-Value line. Notice how easy it is to make a quick muscle pulse by raising an eyebrow or tensing your jaw or tensing your forehead temples.

5) Select "Test New Value" to go to test window. In this window, try alternating relaxing and tensing facial muscles to see if you can comfortably move the yellow bar within the blue region.

6) Select "Apply New Value" to save Base values and close Auto-Adjust window. 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) is too high. Have someone else wear the Cyberlink headband to determine if high value is due to high muscle tension of current user or the hardware.

If the same warning message comes up with someone else wearing the headband then problem is probably due to excessive AC noise. If you are using a Laptop computer unplug Laptop AC power supply and then plug it back in and try again. Perhaps unplug the Cyberlink AC adaptor and try again. For further information and suggestions on how to reduce AC noise refer to the Help screens in the Auto-Adjustment window; go to Possible Problems and Reducing AC Noise.

If the B11 Base-Value is below 250 with someone else wearing the headband, then the your high value indicates you were operating with high muscle tension. Go back and try again. If the B11 Base-Value is still too high, manually adjust the B11 Base-Value down. Click on "Manual Adjust B11 Base Value" and adjust slider to obtain a value of approximately 125. Proceed by selecting "Apply New Value". At first B11 will not be a viable control, but over time facial muscle tension may reduce allowing B11 to be used as a useful control.

Brainfinger 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, relaxing the muscles in the back, maintaining a soft focus, and allowing the brain to become 'quiet' or 'still' as if in a daydream may achieve an increase in the height of B4-B6.

- *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 facial muscles relax.

Note: Have the user spend a few minutes observing how the brainfingers fluctuate when they try various facial movements and mental state changes.

Brainfinger Adjustments

The brainfingers may need to be adjusted before continuing. 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 and mental state changes. 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.

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)

Note1: It is possible to adjust brainfingers B1-B3, B4-B6 or B7-B10 as a separate group instead of B1-B10 at the same time. Within the Shift B1-B10 window click on the down arrow next to "B1-B10, then select the desired brainfinger group you want to adjust.

Note2: Brainfinger Adjustments made in the Brainfingers Display will apply to "Brain Candy" and "Brain Billiards" as well.

Working with Users: Step 1

Can be done in 15-20 minutes

Introduction to Step 1

In Step 1 we assume you are working with an individual with ALS. The goal for Step 1 is to observe brainfinger responsiveness, to determine what level of control is possible by the user, to introduce the user to the various Brainfinger Training Games, and observe which Brainfingers may be useful for control. Think of Step 1 as an introduction to Brainfingers for the user.

You will want to create a User file for the individual. If you select "Users" in the menu bar you can create a new user. When a new user is created, default values are set. B11 is set as the brainfinger for click control and up/down cursor movement. B2 is set for left/right control. We suggest you go through the protocol of Step 1 with the default brainfinger selections of B11 and B2 to start, even if you feel the user has no muscle control left. Use the adjustments to make B11 and B2 as responsive as possible for the user. Give each of the training windows a try. If it is obvious that the user has no control over B11 after a few minutes of trying skip to the next training window. Try making settings more sensitive and encourage user to reduce their effort if they are able to control B11, but in an over-controlling kind of way.

Begin with the Auto-Adjust Window

Either startup and access the Auto-Adjust window or restart the Auto-Adjust window by selecting Adjustments and then Auto-Adjust. If this is the first time to work with this individual go to Users and create a new user. Creating a new user will result in the Auto-Adjust window coming up for the new user. Direct the user to relax facial muscles to keep the yellow line as low as possible. Click on Start Auto-Adjust and direct user to follow the blue line across the window.

Note the B11 Base-Value. Is it similar to your value? Instruct the user to make a quick muscle pulse. Does it go up quickly and come down quickly? If the answer is yes to both of these questions then the user will probably have enough control to operate at Level 2. If the user can create a muscle pulse but it goes up slowly and comes down slowly then the user will probably be able to operate at Level 2, and you will have to take special care to help the user learn more subtle muscle control. If the B11 Base-Value is as low as or lower than your base value and the user is

not able to make a significant muscle pulse then they probably will have to operate at Level 1 control.

Level 1 Control: If they cannot make simple muscle pulses then they probably won't be able to use the B11 muscle brainfinger for control. You will need to help them discover control with one or more of the remaining brainfingers [B1-B3] eye glance, [B4-B6] alpha, and [B7-B10] beta brainfingers.

Level 2 Control: If they can make a pulse but it is slow in going up and slow in coming down, they will probably be able to use B11 for control, but you will have to help them learn to operate B11 at a more subtle/less gross effort. This may take time. If they can easily make a quick muscle pulse and they can control their eyes, they probably will be able to make full use of all brainfinger controls.

Once you have completed the auto-adjustment process select "Apply New Value" to go to the Brainfingers display screen.

Setting up the Brainfingers Display Screen

1. Observe the behavior of the eleven brainfingers to see if adjustments are needed. Direct the user to relax, and to increase each of the four groups of brainfingers, one group at a time.

2. If several of the brainfingers fluctuate most often above or below the blue horizontal boundary, go to the toolbar and click on "Adjustments", and then "Shift & Amplify (B1-B11)". 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.

Brainfinger Training Games - Initiating Motivation and Insight

Use the following training games to provide the user with opportunities to exercise their possible control capabilities. If it seems the user is unable to play a game, do not stop moving forwards with the games. After what seems like an appropriate amount of time, continue on to the next game to allow the user time to discover possible control that they did not know was possible.

Please note that operating Brainfingers for the first time can be exhausting. To comfortably learn and operate Brainfingers, we suggest

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 Billiards

This game provides an opportunity for the user to practice learning how to control all the brainfingers. When you start the game a white cue ball will move very slowly across the screen. The object of the game is to move the eleven balls into position to intersect with the white cue ball.

1) Select "Brainfingers Practice" from the toolbar
2) Select "Brain Billiards"
3) Select "Start Game"

Play two games at the default cue ball speed then select "Game Options" then "Cue Ball Speed" and increase ball speed to 2. Run another game.

Observe which balls the user is able to control throughout the games. The performance here will suggest which brainfingers can be used for control. If they cannot move the B11 (yellow) ball up and down you will have to help them find a possible control with other brainfingers – Level 1. If they can move the yellow B11 ball up and down easily and with subtle control effort B11 should be their brainfinger of choice for clicking and up/down cursor control. If they can move the B11 ball up and down but with gross movements they are probably over-controlling due to previously learned control methods and/or with muscles affected by ALS. With practice their performance will improve as they learn a more subtle way to control B11.

Brain Candy

This game provides another opportunity to work with all the brainfingers. Raising the yellow bar (B11) in the bottom right of the screen (tensing your facial muscles) will increase the speed of the tunnel. Lowering the yellow bar (B11) by relaxing facial muscle tension will slow the tunnel speed down. Adjustments made in the Brainfinger display window apply to Brain Candy.

4) Select "Brainfingers Practice" from the toolbar
5) Select "Brain Candy"
6) Adjust the practice time by selecting "More" or "Less"

7) 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 brainfinger “click” control. The yellow brainfinger line corresponds to B11.

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) Direct the user to relax their facial muscles to bring the yellow brainfinger line as close to the green time line as possible for 5 seconds
5) Then direct the user to bring their brainfinger line above the trigger line by clenching their jaw or lifting their eyebrows, blinking etc. to signal a “bing” sound. Repeat 5 times.

Adjustments

If the user has difficulty creating a brainfinger click, try making the following adjustments.

1. Select “Adjustments” from the tool bar

2. Select “Shift, Amplify, Smooth”

3. **Adjust Shift**:
   a. Shift up if user is unable to raise the brainfinger line above the click trigger line. Shift up until the brainfinger line is sufficiently close to the click trigger line, without the occurrence of false clicks.

   b. Shift down if user is unable to lower the brainfinger line below the click trigger line.

   Adjust Amplify:
   a. Increase Amplify to increase the brainfinger range of fluctuation. This will result in less effort to achieve a given change in the brainfinger.

   b. If the user is exhibiting very low B11 activity, click on the “Amp X 4” button to increase the Amplify

range by four to make Brainfingers more sensitive to user inputs.

4. Select "Apply" to keep changes

5. Repeat Click Setup procedures 1-4 and adjust as needed

6) Observing the users ability to use B11 for clicking will clarify to what level of control the user can initially function. If they cannot create a conscious click pulse no matter how high you Shift up and no matter how high you increase Amplify they will have to use another brainfinger for control. For the purposes of this tutorial consider them to be operating at a control level 1. If they can create a quick B11 pulse they are able to operate at a control level 2. If they can consciously create a click pulse but their B11 signal goes up slowly and comes down slowly consider them to be operating at a control level 2.

7) Select "Close" when you are finished working with Click Setup to return to the Brainfingers window.

Click Game

The Click Game provides additional practice using a brainfinger 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 a target appears. Adjustments made in Click Setup will be maintained in the Click Game. If the user cannot create any clicks within 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"
7) Select "Start"

Please Note: When ever a click occurs, the game waits before presenting the next target. If user has too much false clicking happening it will stop the presentation of targets.

Adjustments

1. If you want to make further adjustments for the user, follow the same procedure as in the Click Setup window. Go to Adjustments to access the adjustment windows. Remember to click "Apply" to save changes.

2. Select "Start" to restart game

8) 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. Wait until Step 2 to help the user find better brainfinger control if needed. Finding and fine-tuning usable brainfingers will occur throughout subsequent training steps.

Grow Game

Brainfinger activity is applied to movement along the up/down or left/right axis. As the user raises and lowers their brainfinger, colored rings will expand or contract from the center of the screen with music relating to the growing and shrinking of the colored rings.

Alternate the axis control to simulate either up/down cursor movement or left/right cursor movement. The colored slide box on the left corresponds to B11, the one on the bottom of the screen correspond to 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 the user increases or decreases B11. Music will begin and colored rings will begin to expand from the middle of the screen when they raise the yellow box above the white line.

Adjustments

If the user is unable to control the movement of the colored slide 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 unable to move the small slide box below, or to the left of the middle white line. This should enable the colored rings to shrink.

b. Shift up if unable to move the slide box above, or to the right of the white line. This should help expand the colored rings and trigger the music.

Amplify:

a. Amplify more to increase the range of the slide box movement. This will increase the responsiveness of the box movement.
b. Amplify less to make the brainfinger and slide box movement less sensitive.

2. Select "Apply" to keep changes
3. Continue playing by selecting "Start" and adjust as needed

5) Once able to control B11, select "Stop Game"
6) Select "Axis to Control"
7) Select "Left/Right," the default control for left/right is B2 (left/right glance).
8) The blue box at the bottom of the screen moves left when B2 decreases; from relaxed eyes. The slide box moves right when B2 increases, from eye glance and eye tension. Music will play and colored rings will begin to expand from the middle of the screen when B2 moves to the right of the white line.
9) Select "Start Game"

Note: If the user has difficulty, try the *Adjustments* procedure above

10) Once the user can 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 the user controlled the colored box in previous exercises. The Pong screen can be rotated 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 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 have difficulty lowering the paddle, or moving it left.
   b. Shift up have difficulty raising the paddle, or moving it right.

   Amplify:
   a. Amplify more to increase the range of the paddle’s movement.
4. Amplify less to decrease paddle movement for a given brainfinger input.
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 user is unable to control the left/right movement of the paddle, try adjusting Shift and Amplify to improve responsiveness for the user.

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

Please Note: At this point we would suggest you end the first day of training. Before going on to Step 2, wait at least two hours, or until the next day. If however, the user had no success with B11 and you had to skip through all the training windows using B11, we suggest you end this session by letting them play Billiards and Brain Candy again. Further observe user control of the other brainfingers to formulate what brainfinger selections you will use for the next session.

If the user exhibited some reasonable amount of control with B11, and wants to continue, and there is still time within the twenty minutes of training, go on to the Easy Maze. Then if the user wants to continue further, move on to the Labyrinth.

Easy Maze Game

The Easy Maze allows the practice of simultaneous up/down and left/right cursor movement.

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

Adjustments
If user is having difficulty controlling the cursor movement, try making an adjustment.

1. Select "Adjustments" from the tool bar
2. Select "Shift & Amplify"
3. Adjust Shift and Amplify as needed
4. Select "Apply" to keep changes
5. Continue playing by selecting "Start" and adjust as needed

Consider turning on the **H**eads **U**p **D**isplay (HUD), an adjustable ring that surrounds the cursor. It can increase awareness and controllability of the cursor 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.

What To Do Next

From here we propose you follow one of two protocols based upon the level of control demonstrated by the user thus far. We suggest the following strategies:

For Level 1:

The intention should be to help the user learn to control a brainfinger for a switch or a click. Probably the only brainfingers they can possibly control will be B3 through B10. If the user has no facial muscle control then the user will have to achieve a conscious change in their brain resonance to consciously change one of these brainfingers.

When an individual goes into a relaxed state from a tense focused mental state their brainwaves tend to slow down. This can be observed as an increase in alpha resonance. When an individual goes from a relaxed state to an increased mental state or state of effort this can be observed as an increase in beta resonance. Thus the protocol should be designed to help the user learn to consciously change and hold their brain states. Use Brain Billiards and Brain Candy to play with all eleven brainfingers. In these windows the user has an opportunity to experiment with consciously changing their mental focus and mental effort to see what changes occur in their brainfingers. Then use Grow

and Pong to learn to control selected brainfingers. Then go to the Click Setup and Click Practice windows to practice creating a click.

For Level 2:

The intention should be to help the user work more successfully with the facial muscle control they have. Due to previous switch devices and degeneration of the users muscles resulting in a loss of fine motor control, a control approach of excessive effort was probably learned. Here the focus should be on helping the user learn to control B11 with a minimum of effort and for it to become automatic. It will be important to carefully adjust the Brainfingers software so the user has an opportunity to work at a relaxed level. Learning to control alpha and beta resonance as well as working with B11 as the primary control is proposed. Control of third party software such as an on-screen keyboard they used with other switches should be included in the protocol.

Even if the user does not show signs of gross motor control or a tendency to over-control it would be valuable to have them learn alpha and beta control as well as control of B11. Practice with B11 as a switch and as an up/down controller so that control becomes automatic.

Step 2

Recommended time: 30-45 minutes

Introduction

Below are presented two possible protocols to follow. If the user was unable to use B11, alternative brainfingers need to be selected for practicing up/down and click control. Follow the Level 1 Control Protocol. Otherwise follow the Level 2 Control Protocol.

Level 1 Control Protocol:

We suggest you begin with Brain Billiards after making needed adjustments in the opening Brainfingers display window and proceed with the training windows listed below.

Brain Billiards

Start with a ball speed of 1, if the user seems to be getting the hang of the game, increase the ball speed to 2 or 3. Observe which brainfingers look like they are the best controlled. If you have yes/no communication with the user, ask them which brainfingers they feel most comfortable controlling.

Brain Candy

Run for a few minutes and observe which brainfingers appear most responsive.

Brainfinger Selection

If a user cannot use B11, you will want to help them find an alternate brainfinger they can use as a switch. If they cannot use B11 their best option will probably be control of a beta brainfinger.

Grow Game

First select what brainfingers are the best guesses for up/down and left/right control in the Grow game based upon what you and the user observed in Brain Billiards. A starting suggestion might be to use B8 for up/down and B4 for left/right.

1. Select “Adjustments” from the tool bar
2. Select “Brainfinger Selection”
3. Select the Brainfingers you want for left/right and up/down control
4. Select “Change”

Have the user work with these brainfingers and observe what happens. You will probably have to make adjustments to Shift and Amplify values to move the users brainfinger activity into the center of the up/down and left/right sliders.

If other brainfingers appeared as equally controllable by the user, try these as well.

Pong Game

Let the user try with the selected brainfingers in the Pong game. You may need to change the game options such as making the ball bigger, slowing the ball down and making the users paddle bigger.

Click Setup

Use this window to begin working with click control. Use the brainfinger that showed the most promise of control in Billiards, Grow and Pong. First change to this new brainfinger by using the Brainfinger Selection feature.

Change Clicking Brainfinger Control

1. Select “Adjustments” from the tool bar
2. Select “Brainfinger Selection”
3. Select the Brainfinger you want for click control
4. Select “Change”

Observe the activity of the brainfinger and make adjustments to Shift, Amplify and Smooth as needed.

Adjustments to Shift, Amplify and Smooth

1. Select “Adjustments” from the tool bar
2. Select “Shift, Amplify, Smooth”
3. Adjust Shift and Amplify
4. Try decreasing and increasing Smoothing
5. Select “Apply” to keep changes
6. Select “Start” to restart the game

Note: If the user creates too many false clicks try to setup the software to compensate for false clicks.

1. Select "Adjustments" from the tool bar
2. Select "Compensate for False Clicks"
3. If a voluntary click is followed by an involuntary/false click, try increasing the "Release Time"
4. If muscle spasms are 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"
5. Select "Apply" to keep changes

Click Game

Use this game to let the user test the effectiveness of their control. Observe the responsiveness of their clicking signal and the presence of fall clicks. Remember that false clicks will slow the rate of presentation of targets.

Easy Maze and Labyrinth

If the user is exhibiting a desire to continue we would suggest finishing off the session with cursor control in the two maze programs.

Level 2 Protocol:

Start in the Brainfinger display. Auto-adjust to check connections and to see if anything has changed dramatically from when you ran the use in Step 1. Then go to the following windows to let the user practice.

Brain Billiards

Use this window to let the user experience control of all eleven brainfingers. Play one game with the Cue Ball speed=1. Then increase the speed to make the game more challenging. Explain how alpha is a different brain state/feeling than beta. Encourage the user to work with that awareness.

Brain Candy

Use this window for further practice of the eleven brainfingers. Point out to the user to exercise control of B11 so they can "follow the stars down the worm hole". This requires subtle control of B11.

Click Setup

Use this window to help the user click with as little effort as possible. If when they attempt to click their signal goes up slowly and then down slowly they are working too hard. Try adjusting the Shift up and Smooth more.

Encourage the user to remember what it felt like to control alpha while they try to relax and lower their baseline activity.

Click Game

To reinforce the feeling of clicking with out using a lot of effort, use this Click Game as a means of practicing. Encourage the user to remember to relax and back off their approach to the game.

Applying Brainfingers To Control Other Software

Once the user has worked with the Click Game 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.

Click on the first button for single switch access. For multiple clicks choose the second button.

A window called the Launch Pad will pop up given you a chance to fine tune adjustments before launching onto the desktop. 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. You can start the 3rd party application at this time or already have it running. Once the application is running any brainfinger clicking will affect the application the same way as the left mouse button.

Step 3 and Beyond

Recommended time: 45 minutes to 1 hour per session

Level 1 Protocol:

We recommend you follow the same procedures you used in Step 2. Start in Brainfingers, and auto-adjust. Then allow the user to practice in Billiards. Go to Grow and practice with candidate brainfingers. Play the Click Game with the most promising brainfingers. The hope is that the user will gain consistency through practice. If the user demonstrates some consistency with a brainfinger we suggest you give the user a chance to control a third party software application such as the on-screen keyboard they used in the past. That is if it was controlled with a click. If the user's clicking becomes proficient give them hands-free control of the Brainfingers software.

Level 2 Protocol:

Follow the procedures you used in Step 2, giving the user time to learn the needed motor skills. Practice is important to make clicking feel automatic. Be sure to guide the user to a less effortful click response. As they become more proficient with clicking give them hands-free control of the Brainfingers software. Once this happens they can go where they want.