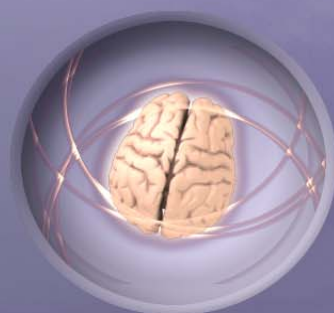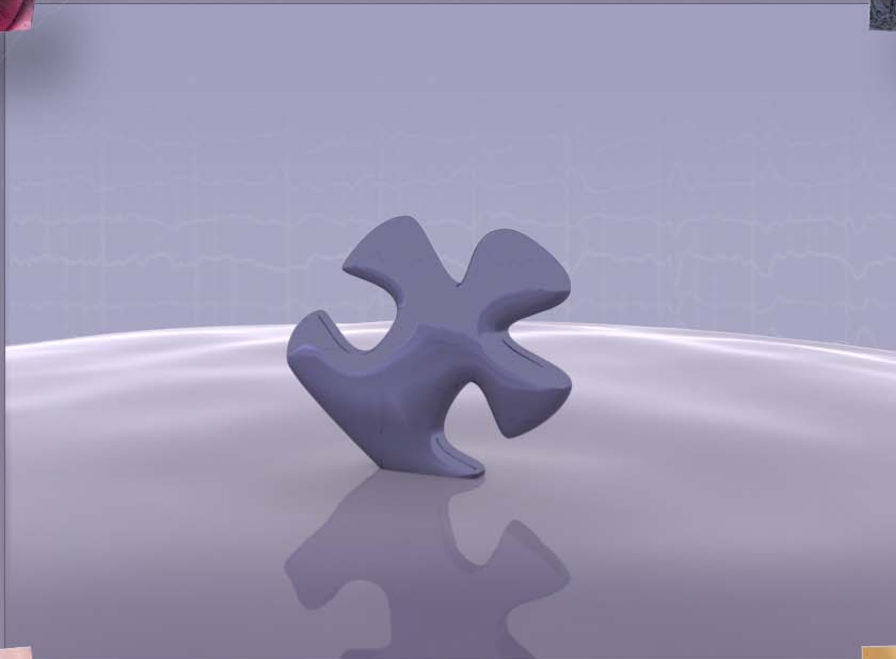# NeuroPuzzles
Manual

NeuroFlasher.com

NeuroFlasher NeuroPuzzles runs on:

Adobe® Flash® Player software by Adobe Systems Incorporated, Copyright © 1996 – 2008 Adobe Systems Incorporated. All Rights Reserved. Adobe and Flash are either trademarks or registered trademarks of Adobe Systems Incorporated in the United States and/or other countries.

Adobe has kindly provided a redistribution license to NeuroFlasher, the details of which can be found in chapter 12.

Table of Contents

1 Welcome

Welcome and thank you for buying NeuroPuzzles from NeuroFlasher. NeuroPuzzles is an Adobe™ Flash™ 8 game for educational uses within BioExplorer and BioGraph Infiniti. We hope you and your clients enjoy this game, its variety of puzzles and the transparent feedback it provides to the client.

We welcome any feedback or questions you might have regarding the game and its use at http://www.NeuroFlasher.com. Note that for additional privileges on the website such as updates, your registration name and serial number might be required.

Note: Historically this manual was written exclusively for use with BioExplorer. We have made the software compatible with BioGraph Infiniti in this last update, but some of the examples still pertain to BioExplorer.

That said, most of the information in this manual focuses on the game itself, and applies no matter in which host program NeuroPuzzles is run.

2 Features & Changes

NeuroPuzzles is a neurofeedback game that allows users to complete jigsaw puzzles with their brain. It's easy to use and reacts in a transparent way: as the client shows 'good' brain activity, puzzle pieces fade in, and for every completely faded in piece, the client is awarded points. *(Note that this behavior is defined in the design/screen that you use with the game and not in the game itself. If you change the design you can redefine 'good' brain activity and you can redefine when and how the client is rewarded).*
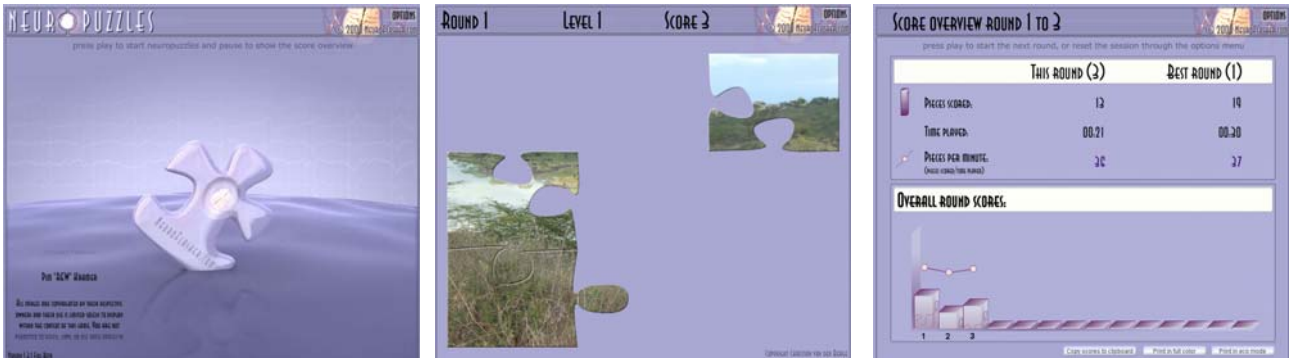

Figure 1 The NeuroPuzzles screens

The game consists of three screens: an intro screen, a play screen and a score screen. Out of the box NeuroPuzzles provides you with over 350 pictures, but since version 1.3 it is possible (and very easy) to add your own collection of images, allowing you to provide each client with their own personal favourites (with improved privacy version 1.4).

If you are already using an older version of NeuroPuzzles and are wondering whether it's worthwhile to upgrade to version 1.4, please inspect the list of changes below. Note that upgrading to 1.4 is free for registered users of versions 1.1 and up.

2.1 New in version 1.4

- the application is now compatible with Thought Technology's BioGraph Infiniti
- the application will now select all image categories by default, EXCEPT those images stored in a folder called _private. In version 1.3 when you were using images brought in by your client, all image categories were selected by default, and you had to explicitly unselect one client's images to avoid showing them to another client. For privacy's sake, this will no longer happen if you put your client's images in a folder called _private. The folder is created for you by default upon installation.
- puzzle pieces now fade in to provide more direct feedback, every reward is now directly shown to the client by fading in the puzzle piece a bit more.
- the score speed can now be adjusted. Although the default speed is the same as in version 1.3, you can make your client 'score' a little faster or slower if needed.
- the image quality for scaled images has improved. This applies both to images smaller or larger than 800x600 as well to scaling of the complete interface.
- the score view now clearly shows the best round criterion at the top. The best round is based on pieces scored per minute, and not on just number of pieces, which confused some clients.
- the interface no longer blocks while a large set of images is loaded, or when a session is started for the first time. We have tested the application with up to 8000 images, and it runs without any problems.
- the BioExplorer design has been simplified, this means 3 things:
  - you now only need a pass/fail signal instead of a score object
  - you no longer have to hook up the midi object, sounds now come from the game itself (which can be muted)
  - **this change is not compatible with your old designs and they will have to be updated.** There are several ways to do this:

1. refer to the manual, the update process is extremely simple. It comes down to deleting two objects and drawing one new connection.
2. send us your design, and we will update it for you
- the game produces a piano sound on score up. Additional samples will be added in future versions. The sounds can be muted through the options menu.

2.2 New in version 1.3

Added:
- personal images:
    - create and maintain your own collection of images
    - keep track of the images shown within a session
- changeable puzzle sizes:
    - increase automatically, stay at a fixed size or change randomly
- timed sessions:
    - set the game to run x rounds, with pauses in between, showing an overview of the round scores after each round and at the end
- 60 new images in different categories
- a lock button which allows you to configure the design correctly without the game running
- score overview improvements:
    - copy and paste the session scores into a document
    - keep track of the best round during a session
    - mouse-over tool tips with info for each round
- adjustable puzzle timings on puzzle completion
- a revamped interface

Removed:
- the change quality option:
    - the game can only be run in high quality now
- debug abilities

2.3 New in version 1.2

Added:
- image category selection:
    - select categories of images you want to show, for example "Cars only"
- 30+ new images of fantastic cars
- score screen printing:
    - print the score screen in full color or economic mode, with the click of a button on the score screen.
- (auto) scaling:
    - when there is not enough space to show the game, it will automatically scale to fit. In addition you can choose to do so yourself, for example to enlarge the game on a bigger display.
- adjustable quality settings:
    - set the game to use a lower quality setting, to facilitate its use on systems that meet the minimum requirements.
- flash check:
    - the combination of the BioExplorer check in combination with ours will notify you when your flash version is not up to date.
- runnable from start menu:
    - There is now a direct link in the start menu to the default NeuroPuzzles design. Assuming your file associations are setup correctly, you can run the game in BioExplorer directly by clicking that menu option.
- key based test page:
    - Due to the new setup, you can run the game standalone from the programs menu, which causes it to run in a key-based mode. Easy for testing & demonstration purposes.

- integrated Flash player in the installer:
  - The installer will now ask you if you wish to install the latest Flash player. No separate installation/download will be necessary.
- easier debugging:
  - In case you cannot get the game to work, we have provided a debugging feature which allows you and us to locate the problems easier.
- better regional compatibility:
  - In certain areas, regional settings were causing BioExplorer to pass numerical data using a ',' (comma) instead of a '.' (dot). This in turn confused the flash player. This problem affects all flash games (PacMan etc), however we have implemented a fix for it in NeuroPuzzles, which allows you to use the game no matter what your regional settings are.
- online version check:
  - The game will now notify you when a new version is available.
- central installation location:
  - NeuroPuzzles is now installed in its own central folder, and adapters for other software such as BioExplorer are installed alongside. If, in the future, integration occurs in other software, the installer will include new adapters. The central software will still be installed once.

3 System Requirements

Minimum Hardware/OS Computer Configuration:

Windows 98, ME, 2000, or XP
800 MHz Pentium 3
256 MB RAM
SoundBlaster or compatible sound card
A graphics card supporting a resolution of at least 1024x768 with 32-bits colors
80 MD Hard disk space

Recommended Hardware/OS Computer Configuration:

Windows XP
2 GHz Pentium 4 or faster
512 MB RAM or more
SoundBlaster or compatible sound card
A graphics card with 64MB or more dedicated video RAM, supporting a resolution of at least 1024x768 with 32-bits color. A single card with dual independent video outputs or two separate cards are required for dual monitor display.
80 MD Hard disk space

Software dependencies:

BioExplorer 1.3+ or BioGraph Infiniti 5+
Flash Player 8 or higher (latest Flash Player 10 is available in installer)
Windows Installer (automatically installed if not present)
VB6 runtime for BioGraph Infiniti Flash Wrapper (automatically installed if not present)
Microsoft's DirectX version 9.0 (available from www.microsoft.com, needed by BioExplorer)

4 Installation

Step 1: Uninstall any previous versions of NeuroPuzzles on your system. Be sure to backup our default design if you have made any changes to it. The installation cannot continue if you do not uninstall the previous version first. Personal images will be left intact.

Step 2: Run the installer by double clicking on the **neuropuzzles_1.4.0_full.exe** file.

The installer will check any dependencies and inform you if any of these dependencies are missing and need to be installed. If everything is ok, you will see the following screen:
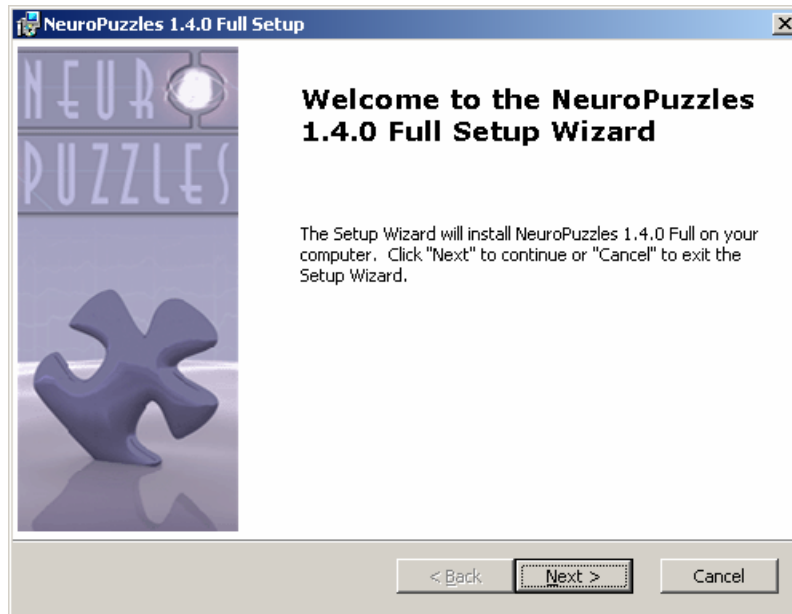

Figure 2 Installation screen after starting the installer

Step 3: Enter your registration data:
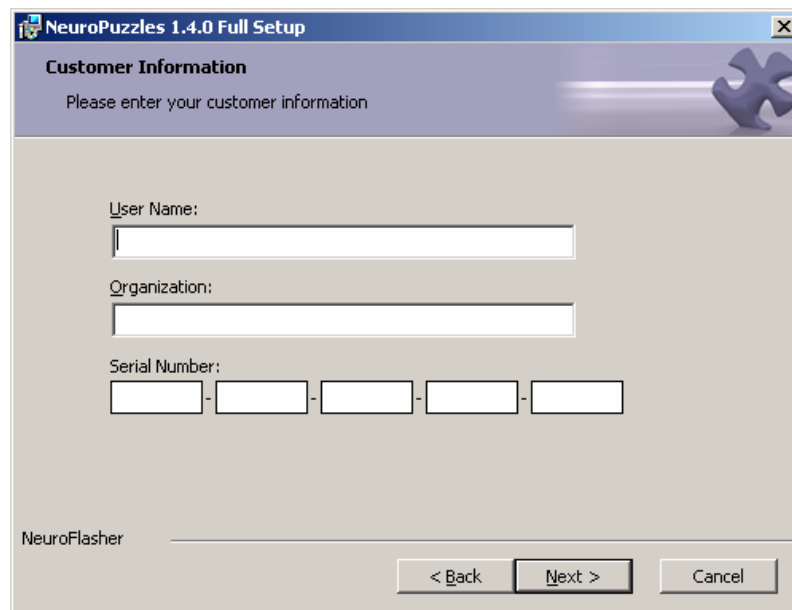
Figure 3 Enter your serial

The **location of your serial number** depends on how you ordered NeuroPuzzles:

- you ordered by mail:
  - after ordering you have received a package by mail
  - your serial number is on a sticker inside the package
- you ordered by download:
  - after ordering, you have received a notice that your account will be created
  - you have received an account creation notification email with your registration info

Note: If you have not received your registration details yet, please contact your reseller or us directly, providing your details (name, email, proof of purchase if available, date of purchase, store, etc). Without this information the reseller cannot retrieve your serial number.

Step 4: Read the license agreement carefully and accept it to continue the installation:
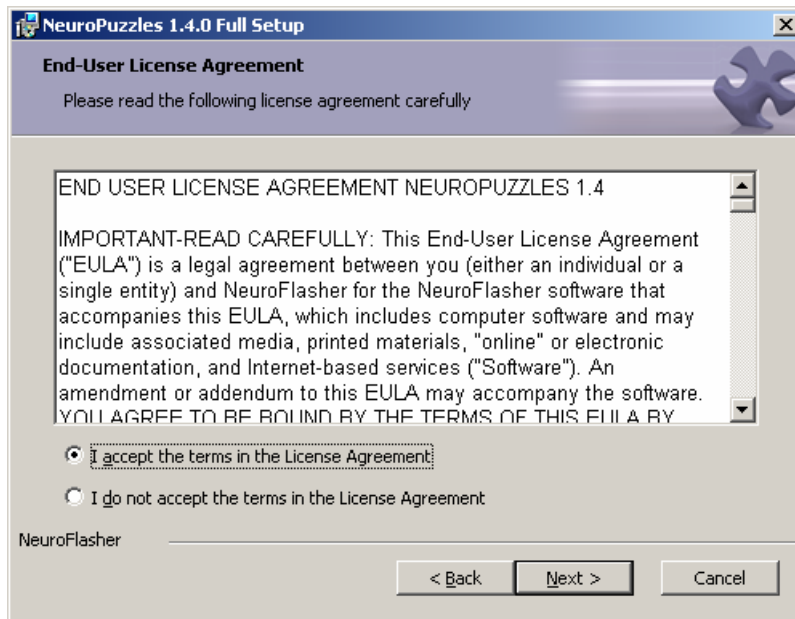
Figure 4 License agreement

Step 5: Check the system requirements specified in the readme:
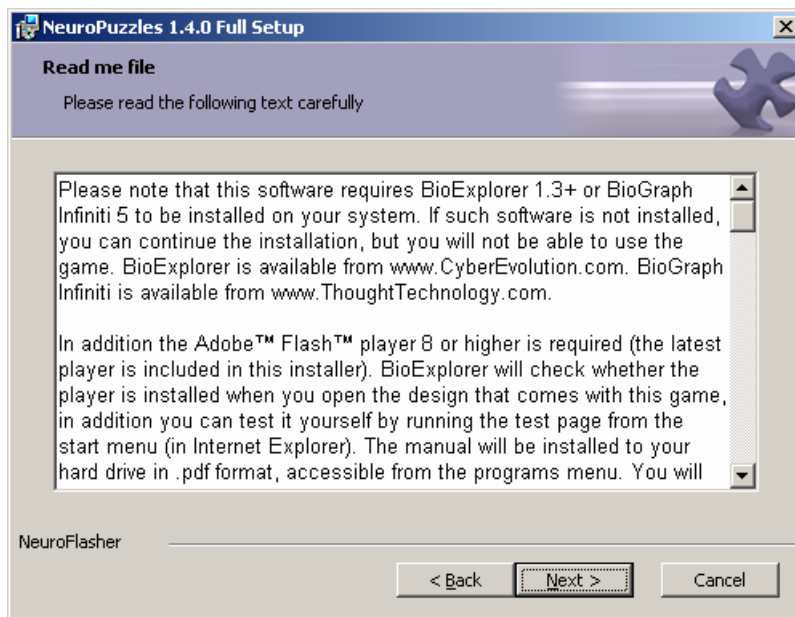
Figure 5 Read me containing info on prerequisites and new features

Step 6: Specify components to install:
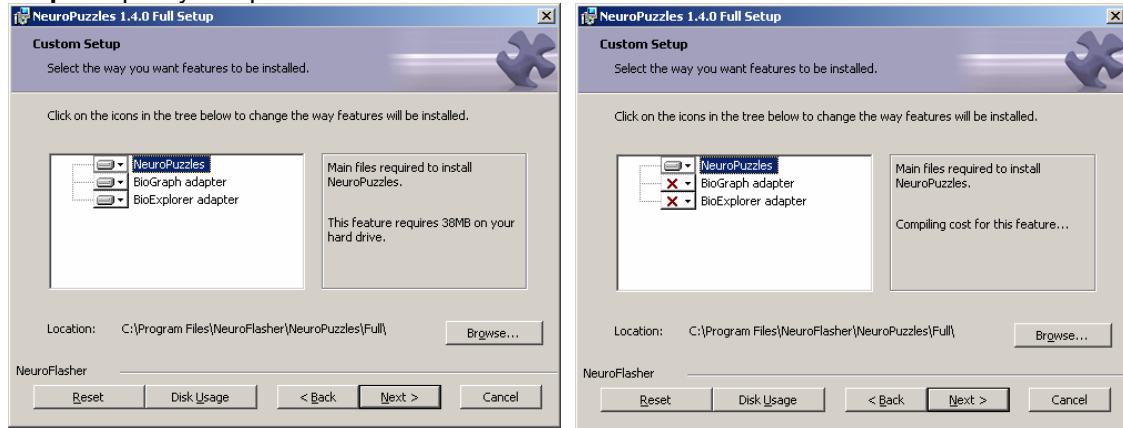
Figure 6 Installation components dialog

This dialog has changed from the previous installer. The dialog will show you 3 options:
- NeuroPuzzles
- BioGraph Adapter
- BioExplorer Adapter

The NeuroPuzzles component will always be selected and cannot be unselected. The BioGraph and BioExplorer components will be selected based on whether the installation could detect these software packages on your system. The left image shows a situation where both BioExplorer and BioGraph were found, the right image shows a situation where neither packages could be found. Other combinations based on your specific configuration are possible of course.

You can change the default selection however: even if BioExplorer is found, you can still choose to only install the BioGraph adapter and vice versa. Even if a package isn't found, you can still choose to install the adapter anyway. In that case you might see one of the following two messages as you progress to the next screen:
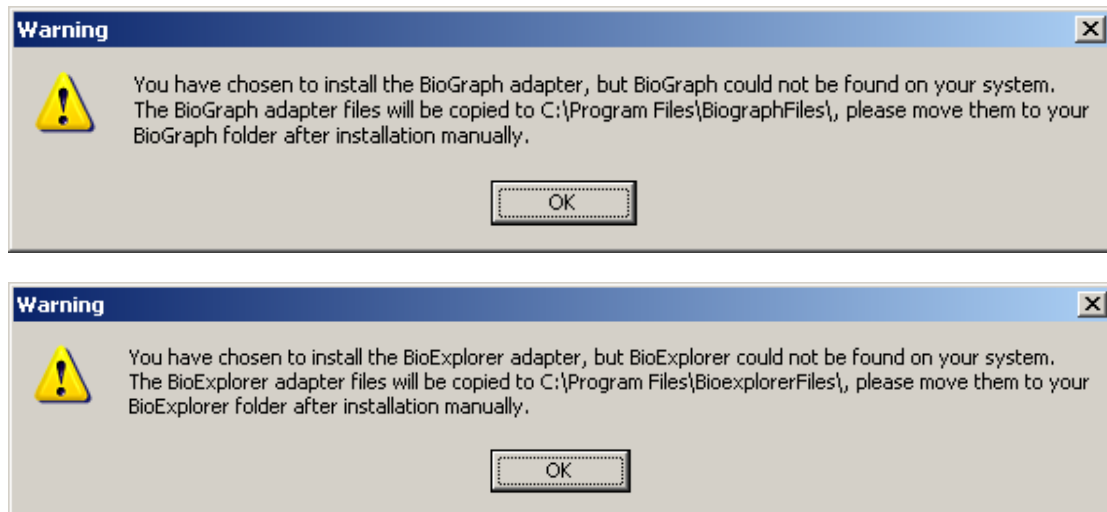
Figure 7 Warning dialogs

The message on your system might slightly differ based on where your program files folder is located, but the idea remains the same.

If you see (one of) these messages:
- the BioExplorer files should go into the root folder of BioExplorer
- the BioGraph files should go into the Externals folder of BioGraph

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The installer will now install all required files. After the installation completes, you will be asked if you want to install the latest Flash Player.

Step 7: Install the Flash player:
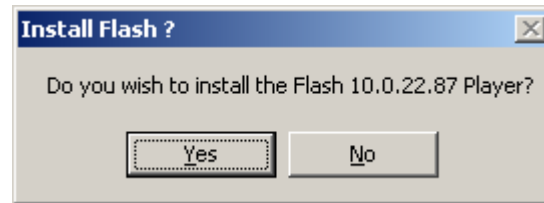
Figure 8 Install Flash?

The Flash player installer will be launched after all game files have been installed.

Alternatively you can:
- Open the test page, which is available from the start menu (the '**Run NeuroPuzzles standalone**' option) and the game folder, which should be opened in *Microsoft Internet Explorer* for a correct installation of the plug-in.
- Visit http://www.adobe.com (using *Microsoft Internet Explorer*) to get the latest player.
- Depending on your setup the player installation may fail, if this occurs, try to install it again using one of the options above.

Step 8: Install VB 6 runtime (optional)**:**
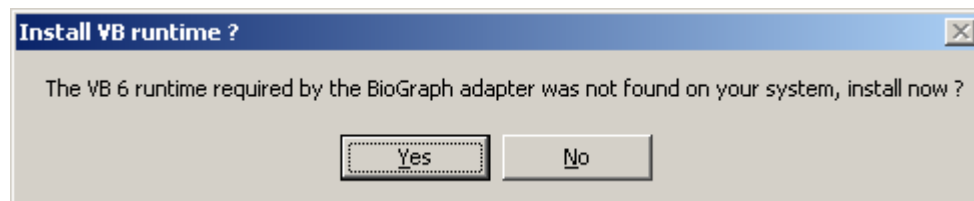
Figure 9 Install Visual Basic 6 runtime

If you have selected to install the BioGraph adapter, the installer will check whether the VB 6 runtime is present on your system and ask you to install the runtime if it isn't found. If you choose 'No' you will have to uninstall/reinstall the software to have another chance. Alternatively you can download and install the runtime yourself from:

http://www.microsoft.com/downloads/details.aspx?FamilyId=7B9BA261-7A9C-43E7-9117-F673077FFB3C&displaylang=en

The installation process has now finished and you are ready to run NeuroPuzzles. BioGraph users please take a look at chapter 8.3 & 8.4 first.

5 Quick start (BioExplorer)

1. You can load the game design in one of two ways:
- if BioExplorer **is not already** running, through the start menu:
  - o Start
    - ▪ Programs
      - • NeuroFlasher
        - o NeuroPuzzles 1.4.0 Full
          - ▪ Run NeuroPuzzles in BioExplorer
- if BioExplorer **is already** running:
  - o Design
    - ▪ Open
    - ▪ Select **Designs\neuroflasher.com\NeuroPuzzles_v1.4.0_full.bxd**
2. BioExplorer will load the default NeuroPuzzles design.
3. An intro screen will appear that will automatically switch to the play screen as you start your session by clicking on the Play or Record icon.
4. The puzzle starts with only 9 pieces at level 1. When the client finishes the puzzle, the lines will disappear for a moment to see the picture at its best.
5. A new puzzle will start with a piece that will appear at random somewhere on the screen.
6. When the game is paused or stopped (automatically or manually), the score screen will appear. The score screen tells you how many points you have collected in the last round, the duration of that round (time in minutes and seconds) and what the speed was (pieces per minute). The lower box provides you with this information graphically over the last 15 rounds.
7. If you click on the Play icon again, you will continue with the puzzle you were playing last.
8. If you want to start over at level 1, you have to move your mouse over the client screen and press the **Options** button: a dialog will pop out. Click on '**Update settings and reset session**' in the top left '**Session control**' panel. The options screen closes and the game starts over at level 1, just like the overall round scores in the score screen.

6 Session walkthrough (BioExplorer)

This chapter will walk you through a sample session step by step. We will mention all the necessary steps that need to be taken and give you some tips on how to motivate and instruct your client during a session. These tips might be especially helpful if you just *started* as a neurofeedback therapist.

Note 1: The tips are based upon experiences made by our therapists. They are meant to give you some ideas, not to tell you how to run a neurofeedback training. Furthermore, they can help you keep your clients more involved during training by motivating them, by providing information and by inspiring them with challenges.

Note 2: This walkthrough assumes you are running the game with the default settings. All the other options available to you will be discussed in detail later.

6.1 *Before you start the session*

1. You can load the game design in one of two ways:
   - if BioExplorer **is not already** running, through the start menu:
     - o Start
       - ▪ Programs
         - • NeuroFlasher
           - o NeuroPuzzles 1.4.0 Full
             - ▪ Run NeuroPuzzles in BioExplorer
   - if BioExplorer **is already** running:
     - o Design
       - ▪ Open
       - ▪ Select **Designs\neuroflasher.com\NeuroPuzzles_v1.4.0_full.bxd**

2. On the therapist screen you will find the objects to set up your session (see BioExplorer manual to learn more about these functionalities). For example, you can edit the training frequency in the **filters dialog box**.
   The filters dialog box will probably not automatically appear on your screen, but you can easily add this object**: Menu → Tools → Filters**. In this dialog box you can change the frequencies that you want to train or inhibit.

3. The ***intro screen*** of the NeuroPuzzles game appears on the clients' screen, and the credits will start to run. By default the game will start the moment you start the session.
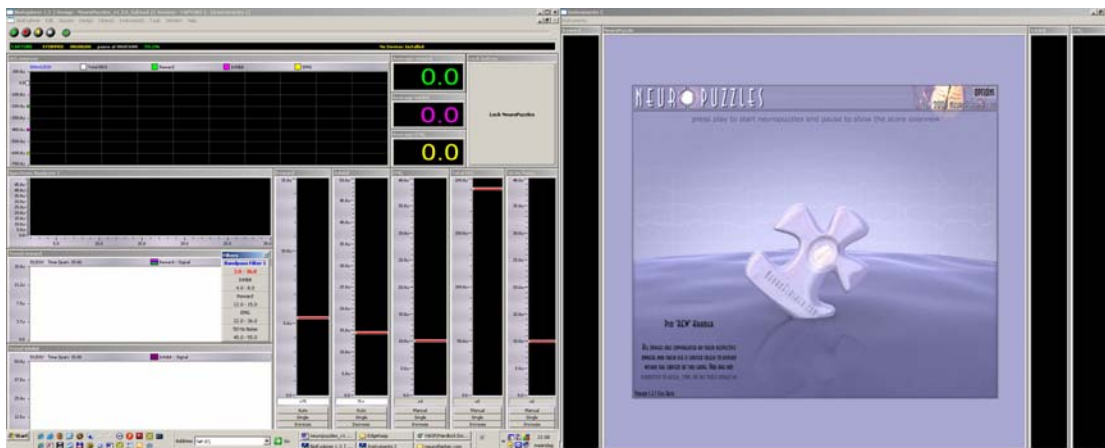
Figure 10 The intro screen

6.2 During the session

1. You are now ready to start the session: just click on **play** or **record** and the puzzle game will begin automatically and show the *play screen.*
2. The *play screen* shows the current round, level and the clients' score and, of course, the puzzle itself. With every 'good' action the client performs, a puzzle piece will fade in a little further and once it has been completely revealed, a point is awarded. A round takes as long as you want, a level represents one puzzle, and the score reflects the pieces shown within this round. More on scores later.
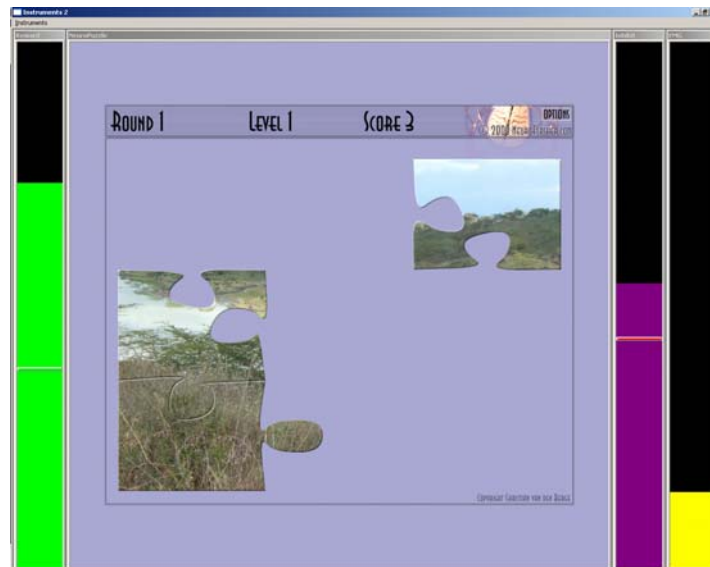
Figure 11 The play screen I

3. When the puzzle is complete, the lines depicting the puzzle pieces will disappear for a short moment and the client will be able to see the picture at its best.
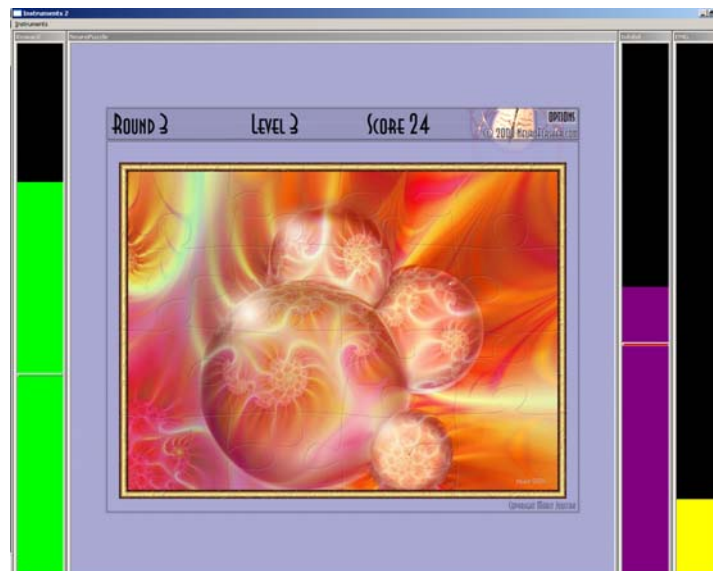
Figure 12 The play screen II

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☞TIP 1: You can tell the client to try and bring him or herself in a state in which he or she is *awake* (the purple inhibit, for example theta), *alert* (the green reward, for example beta) or *relaxed* (if you train alpha) and *relaxed or calm* in body (yellow inhibit, EMG).

☞TIP 2: Let the client imagine that "he or she is a manager sitting on a big chair. As a manager you need to be focused and in control, because you don't want to miss important information. *But* don't exaggerate your focus, because hey you're a manager, you don't want to work too hard ☺! ". Kids like the same story but then sitting as a king or a queen on your throne!

☞TIP 3: Tell the clients to look at the puzzle in a way that, at any moment, you could ask them what they have seen, or what they think the final result will depict. Motivate them to focus their attention in the present by making remarks like: "Don't get distracted, focus on the complete image, on the number of pieces, on other details like the sound from the boxes (if applicable), and so on."

☞TIP 4: Ask the client about the puzzles he or she has seen: "How many puzzles did you see? What did you see on the puzzles? How many flowers? What kind of animals?" You can also let them notify you *the moment* they see the complete image e.g. a flower or animal.

4. When the puzzle is complete, a new level begins. When the level goes up, the complexity of the puzzle is increased by adding additional puzzle pieces (based on the default puzzle size settings, more on this later). The largest puzzle contains 10x10=100 pieces. So when you reach level 15, the puzzle will be 100 pieces and from then the level will still go up, but the amount of pieces will stay the same. The highest level is 'never-ending'.

☞TIP 5: Inspire the client to enjoy that moment by remarks like: "You have accomplished a "task", a "level", a "puzzle" (again). Well done! Way to go!" Also, if you have pictures with a (n inspiring) text, you can invite the client to use this moment to reflect on this text and to integrate it into his or her mind. Note: remember to stretch the time, so the puzzle is showing a bit longer, reflection needs time. See section 7.9.

☞TIP 6: Experience has shown that 3 minutes is a good time period for a round. For children 2 minutes is recommended.

☞TIP 7: When you reach the higher levels, the challenge will be to finish a whole puzzle in one round. In the beginning the challenge is found in trying to build as many puzzles as possible in one round. This is more motivating for children. So, if you train a child you can fix the number of pieces on –for instance- 3x3 or 5x5.

☞TIP 8: After a couple of rounds you could ask the client to just close his or her eyes for a moment to consolidate "what the brain has learnt". You can do this during a short break of –for instance- 2 minutes.

☞TIP 9: Challenge the client to get more points, and higher blocks. This is only relevant if each round takes the same time and the same thresholds are set. Or challenge the client to get a higher speed each round, in this case the same time doesn't matter, the same thresholds do matter.

☞TIP 10: If you keep the same time settings for each round, but you do want to change the thresholds (for shaping the learning process), you can also challenge the client to keep the same speed or heights of the bars.

☞TIP 11: Another way of providing feedback is to show the overall trends of the reward and/or inhibit frequency(band)s in the therapist-screen of the BioExplorer. So the client can

see if he or she is capable to lower the inhibit frequency (band) and raise the reward frequency(band) during the session.

5. After one round (for instance 3 minutes), OR when you press **pause** or **stop** manually, the puzzle stops and the *score screen* appears:
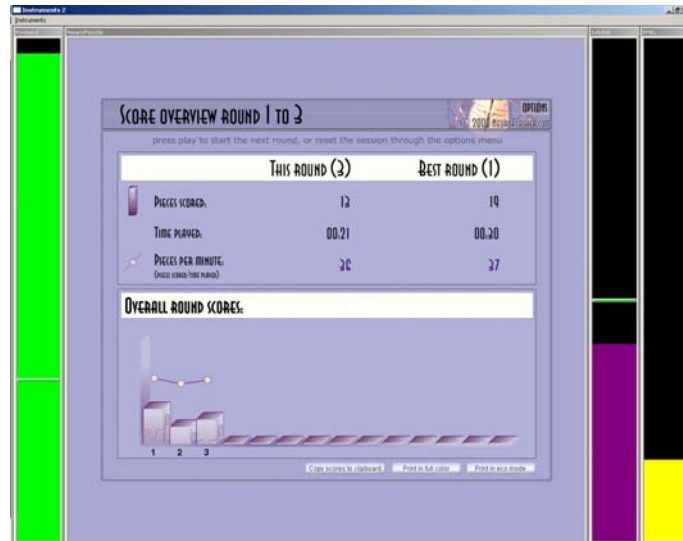
Figure 13 The score screen

6. If you press the **play** button again, you will continue with the unfinished puzzle from last round or a new one in a next level (if it was already finished).
7. In order to re-start the levels, click on the options button in the upper right corner of the game:

Figure 14 The options button

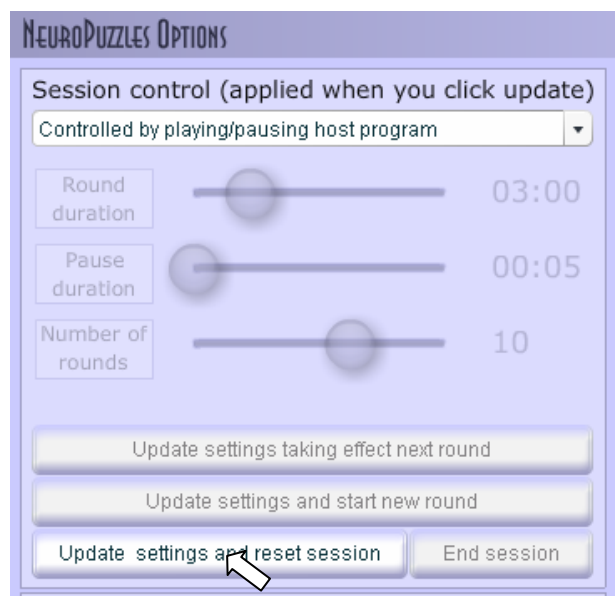followed by 'Update settings and reset session' in the Options dialog:

Figure 15 The session control panel

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☞TIP 13: If your client is more advanced you can switch the amplitude screen of the inhibit, or reward, or –if relevant- the emg to the screen of the client (click right mouseclick on that object and select 'switch window'). Now challenge the client to get the number over or under xx. For instance, if the clients amplitude was about 22u in the first two rounds, challenge the client to stay below that number. You can also set the threshold manually on 22u. Be aware of over focussing on this number, it should just be a nice challenge and a means to work with that provides insight for the client.

☞TIP 14: If your client is more advanced and needs another challenge: let them train some rounds in between *without* looking at the monitor (turn them or the monitor away) and without hearing the tones, so the client doesn't get any feedback at all. Ask them to behave similarly to when they do get feedback. Then, when the round has finished, you can show them the results in the score screen (e.g. are they able to inhibit and/or show the right brain activity?).

6.3 After the session

1. When the session is done, you can print the scores from the score screen for the client to take home, or copy the scores to your clipboard so you can paste them into a word document or email them. You can do this using the buttons on the score screen.
2. Close the design by clicking on the lower **[x]** in the right top (the upper [x], will close BioExplorer!), or by selecting **Exit** in the **BioExplorer Menu**. *Don't save the design*, unless you want to save your changes of course. If you do save the design, you will overwrite the original design with the changes you made in this design during this session. You can only retrieve this design by reinstalling the game, so we advise you to make a backup copy before you make any changes.

☞TIP 15: Ask the client to practise the 'brain state' that they have trained (see also TIP 1) during their daily life, especially at moments when they need to concentrate or relax

☞TIP 16: A nice trigger for helping the brain remember is looking at a screenshot of the neurofeedback screens, depicting the bars and a puzzle.

☞TIP 17: For children, it is always fun and motivating to give him or her a reward for performing well during the session. An example of this could be stickers that they can collect on a special reward card. After ten sessions you can give a child a bigger reward that you've bought or that the parents agreed upon with their child.

☞TIP 18: You can glue a reward card in an exercise book in which the parents and you can jointly write down details like behaviours of the child to monitor the progress and effects. For the child it's great if you write down his or her game score, level and compliments like how relaxed the child was during the game. Using the print option from the score screen allows you to print a nice score overview to take home.
Also adults really appreciate it to have a print of their scores. They like to show it at home or to remember themselves that they 'can do it!'

Using the Copy Scores to Clipboard options gives you a table that you can paste into word for example.

7   NeuroPuzzles in detail

This section discusses all the different features of NeuroPuzzles in more detail, outside of the context of a session. This section explains the features assuming everything is installed and works correctly. If the game fails to load or respond, please refer to the troubleshooting section in chapter 9.

7.1 Basics: loading the game

7.1.1 Loading the game in BioExplorer

You can load the game design in one of two ways:
- if BioExplorer **is not already** running, through the startmenu:
  - Start
    - Programs
      - NeuroFlasher
        - NeuroPuzzles 1.4.0 Full
          - Run NeuroPuzzles in BioExplorer
- if BioExplorer **is already** running:
  - Design
    - Open
    - Select **Designs\neuroflasher.com\NeuroPuzzles_v1.3.0.bxd**

The game will load and you should see something like this (the screen layout might differ a bit depending on your setup):

Figure 16 NeuroPuzzles within BioExplorer

7.1.2 Loading the game in BioGraph

In BioGraph simply open your screen that has a connection instrument in it which refers to NeuroPuzzles. For more details on how to create such a screen, please refer to Chapter 8.4.

7.2 Basics: verifying the game works

- Load the game as described above
- Load sample session data and play it back
- Press play
- If the game is installed correctly, the game will start to run and display puzzle pieces, if not please refer to the troubleshooting section in chapter 9.

7.3 Sessions: starting a new session

After a couple of rounds and levels you might want to reload/reset the game, so it starts over at level 1. Although you can reload by opening the design/screen this is not preferable, since you will reset all the instruments for the session.

A better way is to click on the options button in the upper right corner of the game:
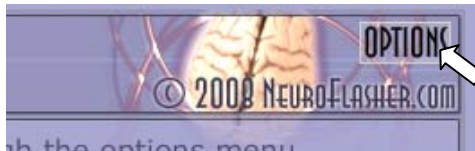
Figure 17 The options button

followed by 'Update settings and reset session' in the Options dialog:
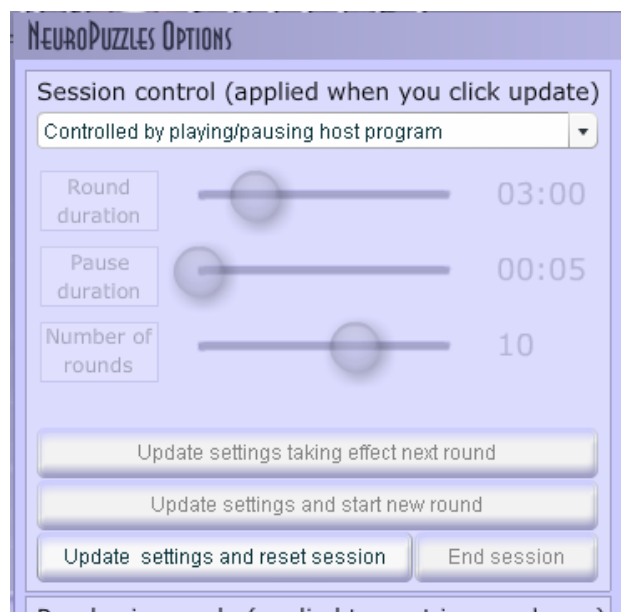
Figure 18 The session control panel

This will reset the session no matter what session mode the game is currently in (see next section).

Resetting the game accomplishes the following tasks:
1) the levels start over,
2) the rounds and scores are cleared,
3) the intro screen will reappear
4) the session mode will change to your selected mode (if you haven't changed the session mode, it will stay in the same mode it already was)

7.4 Sessions: input controlled versus timer controlled

There are two ways of running a session in NeuroPuzzles, '***input controlled'*** and '***timer controlled'***, with '***input controlled***' being the simplest mode, already available in previous versions of the game as well.

7.4.1 Input controlled – Controlled by playing/pausing host program

In '***input controlled***' mode the game is entirely driven by input data from the host program. When the host program stops, the game stops, when the host program plays, the game plays. Each round takes as long as a session in the host program.

7.4.2 Timer controlled – Controlled by session settings below

'Timer controlled' mode is new and allows you to run timed sessions. A couple of pictures explain best:

Open the options dialog:

Figure 19 The options button

Select 'Controlled by session settings below' in the dropdown box:

Figure 20 The session control panel

The disabled controls will now fade in, and allow you to specify the settings for a timed session using the sliders. Click on a slider, hold down the mouse while dragging it to the left or right as you see fit:
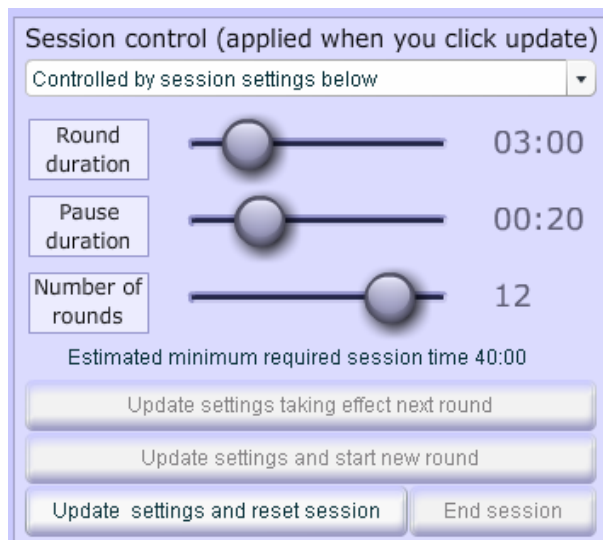

Figure 21 The session control panel

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Note, as you drag the sliders, how the estimated minimum required session time updates to reflect the total session time required to run a timed session with these settings.
Make sure you enter this session time in the host program before starting the session, for example in BioExplorer you can control this through:
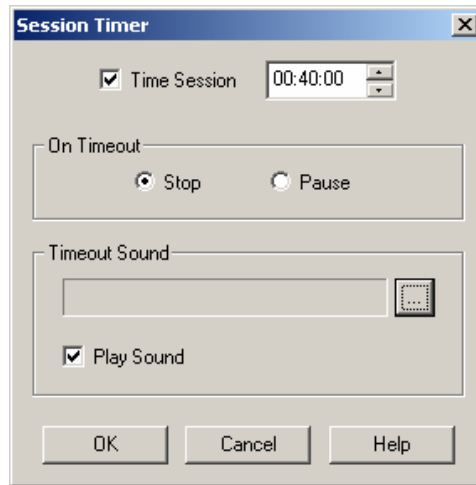

Figure 22 Entering a correct session time

Another option is to uncheck the '**Time session**' which will give you an open ended session, solely controlled by the timers in NeuroPuzzles.

Note: Don't forget to turn off your screensaver, because after a while it will appear, even when the client is training really hard (and it's not really motivating)! Or be alert and press CTRL quickly periodically before the screensaver shows.

If you are satisfied with your settings click '**Update settings and reset session**'.

The dialog will close and your timed session will start. Based on whether the host program was already playing, you will see the play screen, otherwise the intro screen will appear, telling you to press play.
If you need to pause the timed session for whatever reason, simply pause the host or click on the **lock NeuroPuzzles** button (BioExplorer only). The game will hold in it's current state until you press play or unlock again. Note however that during normal use in this mode, you will press play once at the start of the session, and will leave the rest up to NeuroPuzzles, until the session has ended and all the rounds have been completed.

Note how the play screen differs from the input driven mode in two ways:
* the round count is displayed as x/y instead of x, for example 1/10
* a progress bar is visible along the top of the screen denoting the time left for the current state of the game

During a timed session, there are several options available to you, previously disabled:
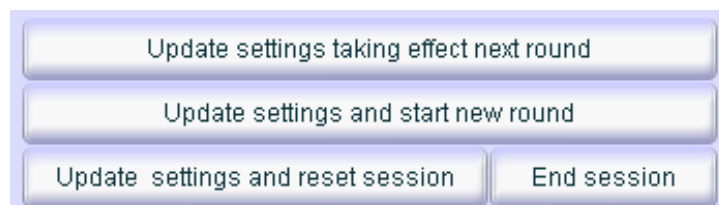

Figure 23 The session control options

Update settings taking effect next round, will use your new settings, but only after the next time the score overview has been shown.

Update settings and start new round, will use your new settings, **and go** to the score overview immediately effectively ending the current round and starting a new one.

Note that if you press either of these buttons **during** the time the score overview is being shown, that they have exactly the same effect. In addition if you try to update the settings in the last round you will receive warning:

> **WARNING**
>
> The specified amount of rounds is less or equal to the number of rounds that have already passed. Please increase the number of rounds, or choose reset instead of update.
>
> [OK]
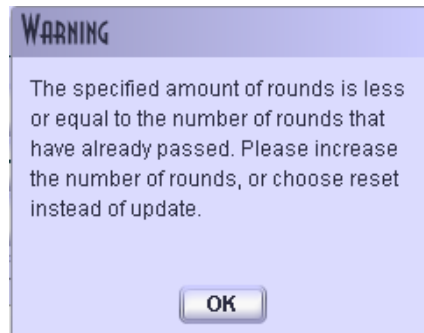
Figure 24 A session control warning

Update settings and reset session will start over the session in the mode of your choosing. **End session** will end the session immediately, and the game will go to the score overview (see next section)

7.5 Sessions: ending a session

There are different ways to end a session:
- in 'input controlled' mode you can simply stop or pause the host, the game will go to the score screen.
- in 'timer controlled' mode you can:
    - wait until all rounds have played out
    - click the 'End Session' button on the session settings panel,
    - in both cases the game will display the score screen with a message indicating the session has ended.

Pressing stop/pause while the game is in **session controlled mode,** will not end the game, instead a warning will be displayed that the game has lost its input, and the game will hold until you press play again.

Please refer to the previous sections 7.3 and 7.4 for more information.

7.6 Image categories: selecting

7.6.1 In general

The images in NeuroPuzzles have been divided into different categories, allowing you to choose the categories that fit your client best. In order to select different categories, open the options dialog by clicking the options button in the right upper corner as previously shown and select the categories you want to use the images from (the list of categories you are seeing might differ slightly from what is displayed here due to last minute changes in the image set):
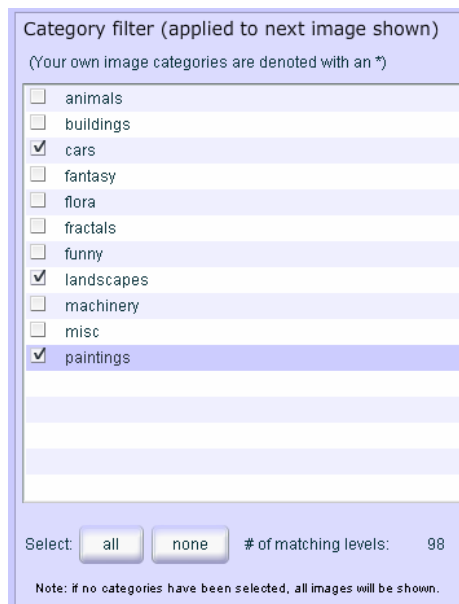
Figure 25 Category selection

As a shortcut you can start with all categories selected or no categories selected and make your adjustments based on those selections. The number of matching levels will update to reflect your selections. Note that selecting **none** of the categories has the same effect as selecting them all, since it means no filter is applied.

7.6.2 Private categories

If you have added images in a directory _private, you will see two things:
- even if you select all images, the private categories will not be selected
- if you select no categories at all, the image count will reflect all images minus the private images.

What this all means is that images from private categories will **never** show, unless you **explicitly** select their categories.

7.7 Image categories: adding your own images

NeuroPuzzles allows you to add your own images. However there are some things you have to keep in mind:
- images have to be stored in a special location
- images should be in jpg, jpeg, gif, swf or png format
- the perfect image size is 800 wide and 600 high. Using a different size will scale the image (the proportions are constrained), but using a much larger or smaller image will result in a lower quality and in case of a much larger image, possibly memory issues
- images should be somewhere around a maximum of 300kb (which is already **very** large for an image of that size)

Please refer to the next sections for more details.

7.7.1 Where to store your images ?

Images have to be located in a subdirectory of your NeuroPuzzles installation to be precise in:

assets\your_own_images

If you have installed NeuroPuzzles into the default location, the complete path to this folder will be:

C:\Program Files\NeuroFlasher\NeuroPuzzles\Full\assets\your_own_images

You can also reach this path by selecting:
- Start
  - Programs
    - NeuroFlasher
      - NeuroPuzzles 1.4.0 Full
        - Open Personal Image Folder

Before you start copying images to this location, please note that images **have to be in subdirectories as explained below**.

7.7.2 Adding (private/hidden) images into categories

Adding images into categories is done in a couple of easy steps:
1. Open your personal image folder (see 7.7.1)
2. Create directories in this folder to hold your images, for example '**animals**'
3. If you want to, create subfolders to manage your image collection, for example, within the aforementioned directory '**animals**', you can create a directory '**cats**'. One special type of folder has been added in the last version: **_private.** If you add images to this **toplevel** folder, the image categories in this folder will not be selected by default.
4. Copy images into the directories you have created. You **should not** copy images to the root of your personal image folder or higher.
5. **Run the index updater** (why will be explained below). You can run the updater by selecting:
   - Start
     - Programs
       - NeuroFlasher
         - NeuroPuzzles 1.4.0 Full
           - Update image index
   - alternatively you can run the updater manually from the assets folder by double-clicking update updateIndex.bat
6. **Restart NeuroPuzzles**
7. **Fix any errors you encounter by following the hints and instructions in the game. This might require repeating steps 1 to 7, renaming or deleting files (see below).**

Why do you have to run the index updater?
NeuroPuzzles is a game written in Flash, and Flash is a technology which cannot access your hard drive (which is good). That also means however that Flash cannot determine by itself which images are available to it on your hard drive, it needs some help.

Help comes in the form of an index.nps file which stands for index.neuropuzzles. NeuroPuzzles always checks this file for information on the images that are available to it, and you create and update this file by running the updateIndex.bat

Both files are very simple and you can open them in any texteditor to inspect their contents, but do not change them manually, since the game might no longer work.

Why do you have to restart the game after updating the index?
The image index is read as the game starts. Thus in order to reread a modified index, the

---

game requires a **restart** (not a reset). **Restart** the game by reopening the design.

If everything went well, each directory created in your personal image folder becomes a category for you to use in NeuroPuzzles:
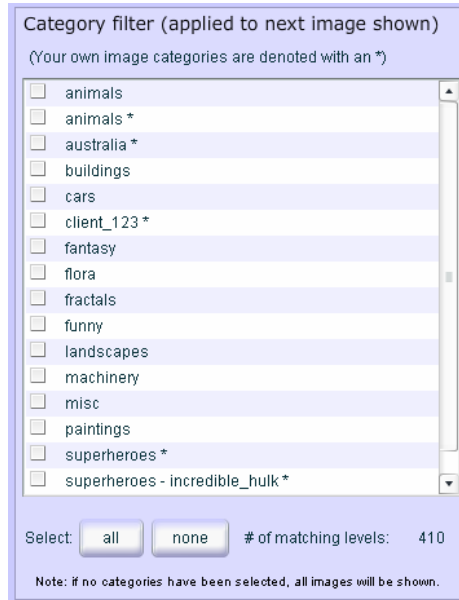
Figure 26 Own image categories

Please note a couple of things:
- your own image categories have been added alphabetically
- your own image categories have been marked with an asterisk.
- your own image categories can have the same name as preinstalled categories, causing them to appear twice: once with, once without an asterisk.
- if you left directories empty, they will not be present as categories
- subdirectories appear as names separated with a dash, for example if you have a directory 'superheroes' with a directory 'incredible_hulk' in it, it will show up as 'superheroes – incredible_hulk'
- although not shown in the image above, the sort order will be: public own images (selected by default), preinstalled images (selected by default), private own images (not selected by default)

In case everything did not go well, please refer to the next section.

7.7.3 Fixing errors
Obvious errors
There are some restrictions when adding your own images as described in 7.7, and where possible the game tries to help you out by notifying you of any errors it has found:
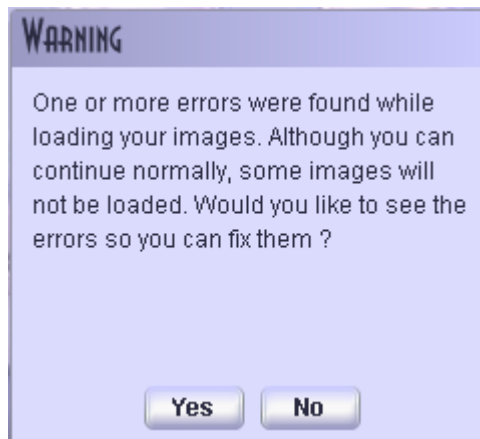
Figure 27 Image error notification

Clicking 'no' ignores the errors and continues to run the game, but of course some of the images (or even all of them) might be missing, without you knowing why. Therefore we advise you to click 'yes' in this case which will take you to the 'Image Error Overview' page:
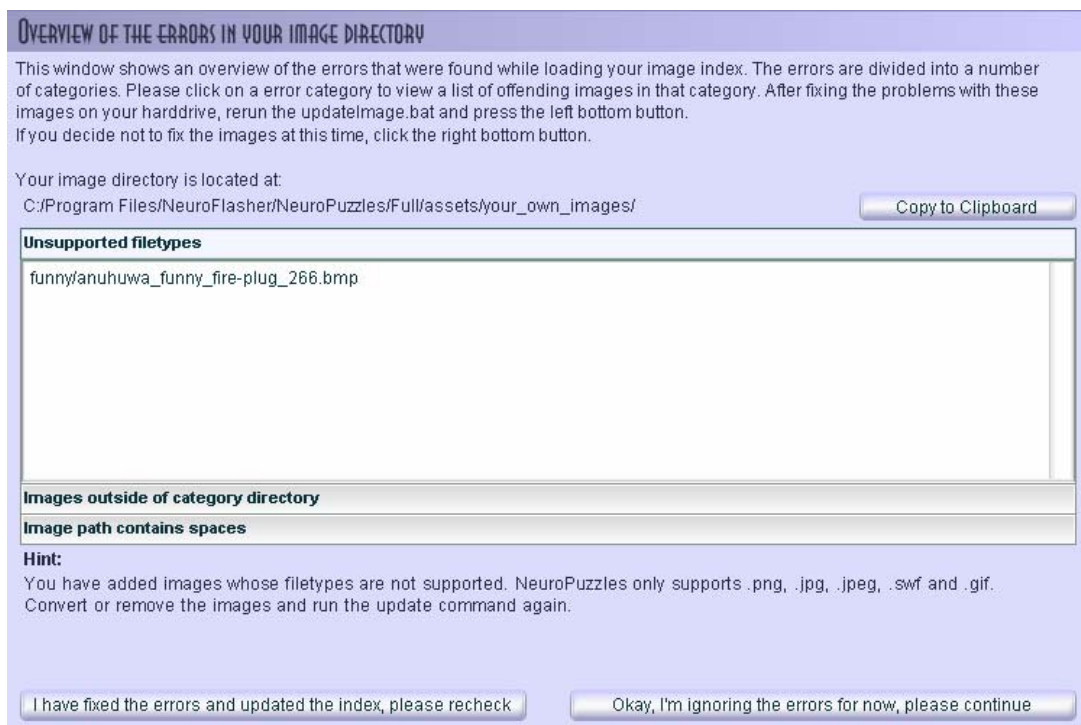
Figure 28 Fixing errors

There are a number of items on this screens you should note:
- the screen displays your image directory. Flash does not have enough rights on your computer to open this for you, but the game does help you out by allowing you to copy the path to your clipboard for easy pasting into Windows Explorer for example
- the game divides the possible errors into different categories, and you can see the list of images within each category by clicking on the appropriate header in the accordion pane.
- a hint is displayed for each separate error category about how to go about fixing the problem
- you can **recheck** the index from within this screen without restarting, but you **cannot** regenerate the index from within this screen. **So if you think you have fixed an error, but haven't updated the index, rechecking the index will not help.**

Please follow the directions in this screen to fix your errors then press the left bottom button to continue, or the right button to ignore the errors after all.

Subtle errors
The obvious errors are errors NeuroPuzzles can detect at startup. There are a few subtle errors which it cannot detect at startup, and sometimes not even after trying to load the image:

- **A file is present in your index, but no longer on your hard drive**
  This happens if you remove files, but forget to update the index. According to the game the format of the index file is valid, but during the game you will receive a 'file not found' message:

Figure 29 File not found message

  The path will be copied to your clipboard, so you can check where the problem lies.

- **A file is of an unsupported type, renamed to make it look like a supported type**
  In this case, NeuroPuzzles/Flash will try to load the file, which succeeds since the file is there, but it cannot handle the data, which will result in no error at all, **just a blank screen** instead of a puzzle. Make sure you do not for example rename .bmp to .jpg files, this will not work, you have to actually convert them using some kind of conversion tool. Google is your friend:
  http://www.google.com/search?hl=en&rls=com.microsoft%3Aen-us%3AIE-SearchBox&rlz=1I7GFRC&q=bmp2jpg.exe

7.8 Changing puzzle size modes

Not every client is the same, based on age, ability and other factors you might want to limit the maximum puzzle size, surprise with a random size or keep the size the same. You can control these settings through the puzzle side mode panel in the options screen:
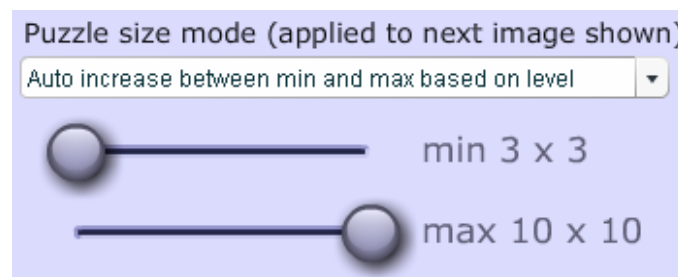

Figure 30 Puzzle size modes

This panel allows you to switch between 3 modes:

- auto increase:
  - puzzle sizes will increase by 1 per level in any direction, for example based on the settings above: 3x3, 3x4, 4x4, 4x5 etc up to 10x10. You can drag the sliders to adjust the start and end values.
- constant size:
  - all the puzzles will have the same size: 3x3 or 4x4 or 5x5 or ....
- random size:
  - puzzle sizes will vary between the given limits, without any relation between level and size. However the difference between the width and height will never be more than 2. For example you might see 3x3, 5x3, 8x6, 4x3, ...

7.9 Controlling the time to watch a completed puzzle

By default a completed puzzle will remain visible for about 2 seconds. This is a bit short if you want to ask your client questions about the puzzle for example, therefore you can alter this default setting through the options panel up to 30 seconds:
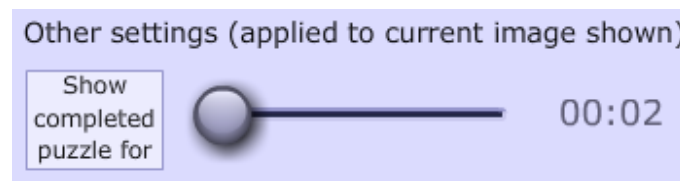

Figure 31 Changing the default puzzle pause

7.10 Controlling the fade in speed

New in version 1.4 is the fading in of puzzles pieces. Instead of 'gathering' enough points to show a puzzle piece, direct feedback is provided with every bit of reward the client receives, which is shown by fading in the puzzle piece a bit more. Once the piece has completely faded in the point is awarded. Default the score 'speed' is exactly the same in 1.4 as previously, however with this new functionality comes to option to change the default score speed. Although you will usually control this through the design/screen, this option gives you more fine-grained control over the scores:
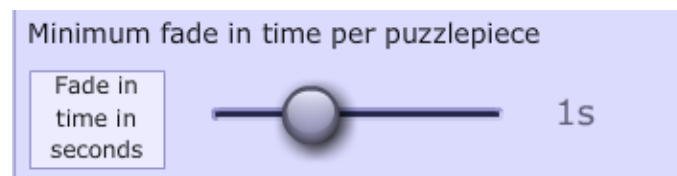

Figure 32 Changing the default puzzle fade in speed

Do remember to write down your settings for a specific client if you change them, so you can still compare scores between sessions.

7.11 On scores

With regards to the score screen and scores in general there are a few things worth knowing:
- the best round is selected based on the **highest puzzle pieces per minute** score and not on the **highest puzzle pieces per round** value.
- moving over a bar in the lower diagram will provide you with a tooltip displaying the data for that particular round
- you can print all the scores with or without color or you can copy a detailed log of the round & score information to your clipboard, which allows you to paste this data into a word document for example.

A big difference with respect to versions of NeuroPuzzles prior to 1.3 is that scores will be registered anytime the play screen is active. In the previous versions you only received a

point when a puzzle piece was shown. The big difference lies in the fact that where you wouldn't have received a point in the old version while a new puzzle was loading, or while you were in a 30 second pause watching a still image, in the new version, you will receive points during that time.

We realize artifacts may occur during these times, but awarding points will still be more accurate than not awarding them. Doing it absolutely correct involves adjusting session times based on the duration of the pauses, and loading times of the images, which will lead to incomprehensible session times and make the game much more complex than we wish it to be.

7.12 Miscellaneous options

7.12.1   Toggle scale

Clicking this button will turn the autoscale feature on or off. By default the autoscale feature is on.

7.12.2   Skip image

If for whatever reason you want to skip the current image without changing everything else, click the skip image button in the options panel.

7.12.3   Image log

To copy a log of the images shown to your client in this session, click the 'image log' button in the options panel. This will create a log for the current session, for example:

C:/Program Files/NeuroFlasher/NeuroPuzzles/Full/assets/preinstalled/flora/hopper_droplets_29.jpg
C:/Program Files/NeuroFlasher/NeuroPuzzles/Full/assets/preinstalled/misc/wijk_fireworks_105.jpg
C:/Program Files/NeuroFlasher/NeuroPuzzles/Full/assets/preinstalled/misc/wijk_cowboys_126.jpg
C:/Program Files/NeuroFlasher/NeuroPuzzles/Full/assets/preinstalled/fractals/joustra_fractal_210.jpg
C:/Program Files/NeuroFlasher/NeuroPuzzles/Full/assets/preinstalled/animals/hopper_sheep_213.jpg
C:/Program Files/NeuroFlasher/NeuroPuzzles/Full/assets/preinstalled/buildings/manuhuwa_castle_223.jpg
C:/Program Files/NeuroFlasher/NeuroPuzzles/Full/assets/preinstalled/animals/berge_flamingo_238.jpg

7.12.4   Toggle audio

This button will mute/unmute the piano audio on each puzzlepiece.

8 Information on the design/screen

8.1 The default BioExplorer design

If you're a passionate BioExplorer user you have probably already created your own designs that you want to use. If this is the case, please follow the instructions of section 8.2 to implement the NeuroPuzzles game in your design.

If you just want to start as soon as possible, use the ready-made design that is included with the game. The purpose of this design is that you can just press play and get started, of course depending on the wanted neurofeedbackprotocol of your client!! This specific design will,:

- reward beta 12-15 hz and
- inhibit theta 4-8 hz,
- and EMG 30-45 hz.

Please note that this design is just a default design, You'll need to know the specific neurofeedback protocol of your client and change the filters if necessary, that's your own responsibility as a therapist. How you can change the filters, you'll find in section 8.1.1 Filters.

To learn more about all the specific details of each object we refer you to the manual of the BioExplorer. In this section we'll just tell you shortly what you see and what the main functions are.

8.1.1 Instruments 1: the therapist screen

EEG sources
This object shows the raw EEG data, the data of the reward and inhibit frequencies you have chosen and the EMG data. It shows the course and the amplitudes of the data.

Spectral analyzer
The spectral analyzer shows all the raw EEG (2-36Hz) counts as input for this object. The data is displayed in the form of bars. The height of the individual bars is determined by the amplitudes of the different frequencies.

Trend reward
This line graph denotes the progress of the amplitudes of the reward frequency (band) over a time period of 15 minutes.

Trend inhibit
This line graph denotes the progress of the amplitudes of the inhibit frequency (band) over a time period of 15 minutes.

Amplitude reward
This number is the average of the amplitudes with regards to the reward frequency (band) over the continuously last 20 sec.

Amplitude inhibit
This number is the average of the amplitudes with regards to the inhibit frequency (band) over continuously the last 20 sec.

Amplitude EMG
This number is the average of the amplitudes with regards to the high frequency band (30-45 hz) over continuously the last 30 sec.

Bargraph reward
This bar shows the continuously changing amplitude of the reward frequency (band). In this object you can also set the threshold at a specific or automatic reward percentage. Its default frequency band is 12-15 hz.

Bargraph inhibit
This bar shows the continuously changing amplitude of the inhibit frequency (band). In this object you can also set the threshold at a specific or automatic reward percentage. Its default frequency band is 4-8 hz.

Bargraph EMG
This bar shows the continuously changing amplitude of the EMG frequency band. In this object the threshold is set manually, but can be changed if needed. The client will hear a sound if the threshold is passed.

Bargraph Total EEG
This bar shows the total EEG amplitude of the 2-36 hz frequency band. The threshold is set manually to give you an extra clue when there might be an artifact present.

Bargraph Noise
If the impedance is too high, there is too much 50 hz noise and you will here a sound. This means that you should check the contact between the electrodes and the client.

Filters
The filters dialog box will probably not automatically appear on your screen, but you can easily add this object**: Menu → Tools → Filters**. If you want to get this dialog box as default, **Save** your design. *(note: make sure you have a backup before overwriting the default design).* **In this dialog box you can change the frequencies that you want to train or inhibit!** Just double click on the filter that you want to change and change it.
An other way of changing the filters is to switch to Menu → Windows → Signal diagram. Double click on the bandfilter (very much to the left) that you want to change. Note that if you'll save the changes to your design (when closing), you'll have the same filters again next time. This could be handy. But you can also choose to *not* save the changes and just change the filters every time on-the-fly, by using the Filters dialog box.

8.1.2 Instruments 2: the client screen

At the clientscreen you will see the:

Bargraph reward

Bargraph inhibit

Bargraph EMG

The meaning of these bar graphs is the same as described in the section 'therapist screen'.

In this design a MIDI player is connected as well (check your signal diagram). Your client will hear a tone every time a piece of the puzzle appears. The tones will vary in heights, so it sounds like music!
Did you know you can change the musicinstrument? Just double click on the MIDIplayer in the signal diagram (scroll to the right) and change the instrument. Ask your client what's his or hers favourite instrument.

8.2 Integrating NeuroPuzzles in your own BioExplorer design

Integrating NeuroPuzzles into your own design is very easy if you follow the chart below step by step:

1. Add every object shown (3 in total) to your design. You can change the name of the object like we have, but it's not required
2. Connect your reward (pass/fail) signal to the input denoted with the large **>**
3. Connect all the other outputs and inputs between these objects exactly as shown
4. Copy the correct settings for each object from our screenshots below, leave everything not shown at the default settings.
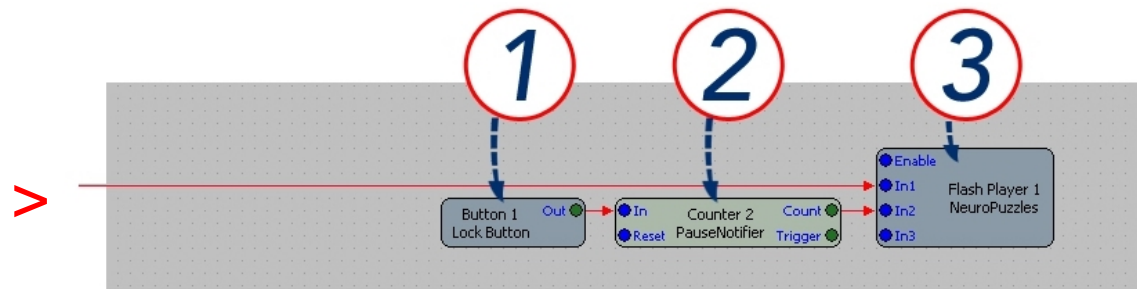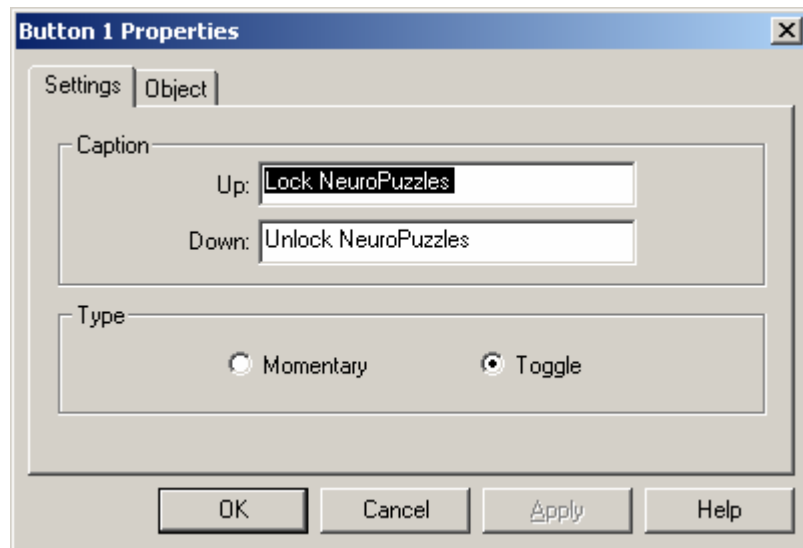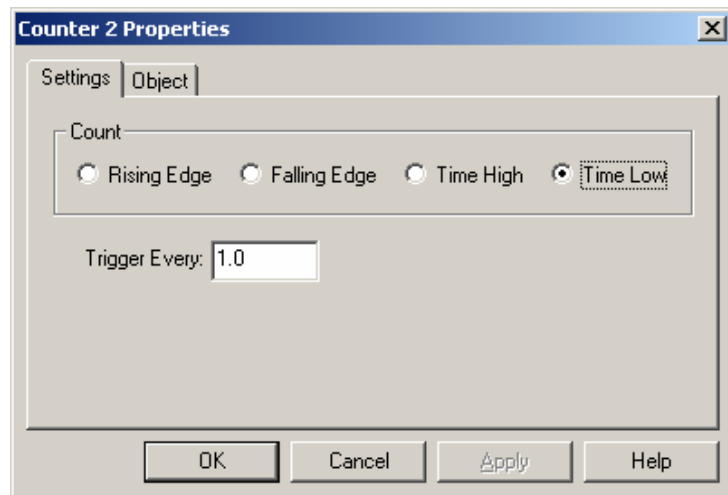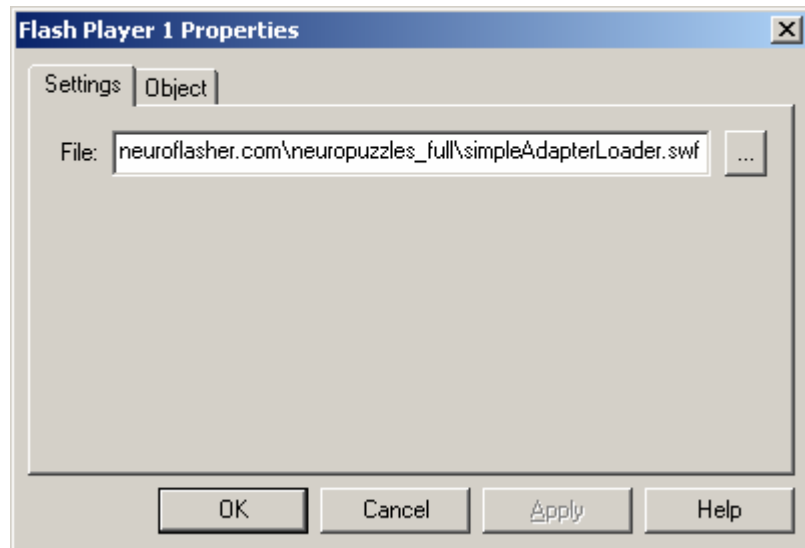

Figure 33 Design

(2)

Counter 2 Properties

Settings | Object

Count
○ Rising Edge   ○ Falling Edge   ○ Time High   ⦿ Time Low

Trigger Every: 1.0

OK   Cancel   Apply   Help

(3)

Flash Player 1 Properties

Settings | Object

File: neuroflasher.com\neuropuzzles_full\simpleAdapterLoader.swf   ...

OK   Cancel   Apply   Help

As you can see migrating from a 1.3 or older design is nothing more than deleting the counter and midi object and rewiring the input signals. Make sure though that your pass/fail signal is connected to In1 and the counter to In2 and not the other way around.

8.3 The Default BioGraph Screen

At this time there is no default BioGraph Screen delivered with NeuroPuzzles. However integrating NeuroPuzzles into BioGraph is very easy; please refer to the next section.

8.4 Integrating NeuroPuzzles in your own BioGraph Screen

In order to integrate NeuroPuzzles into your own screen, fire up your Screen Editor from the BioGraph start menu.

First select the Connection Instrument from the toolbar (above the **^**):
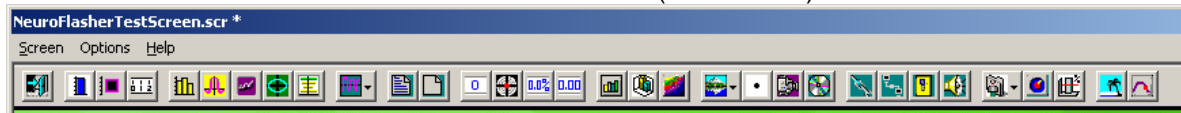

Figure 34 The screen editor toolbar

Now click somewhere in your screen and the following dialog will pop up:
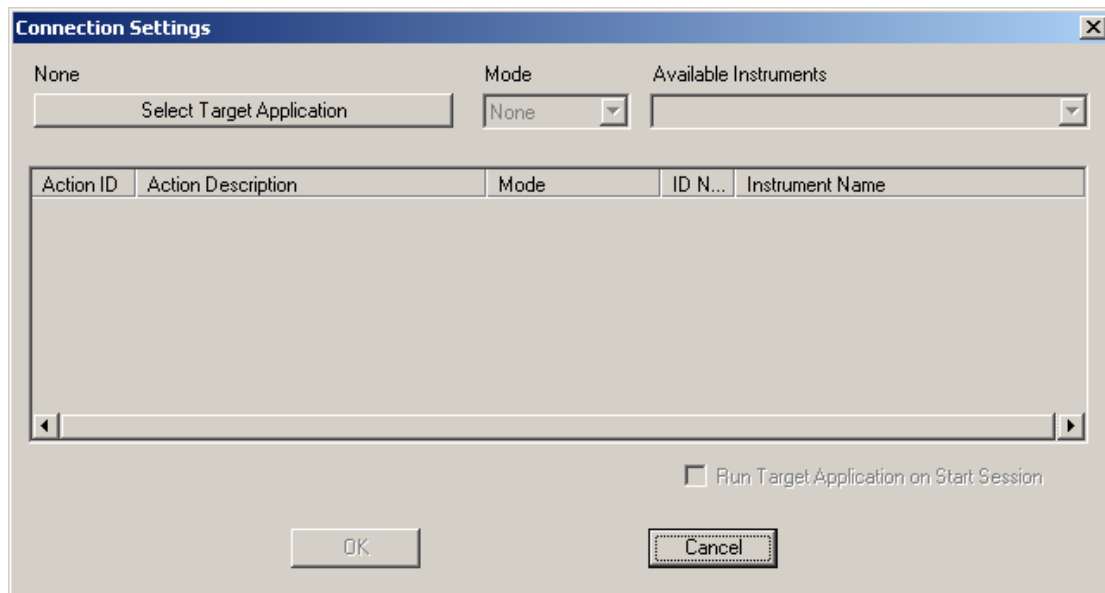

Figure 35 The connection settings dialog

Click on 'Select Target Application' and the following dialog will show:
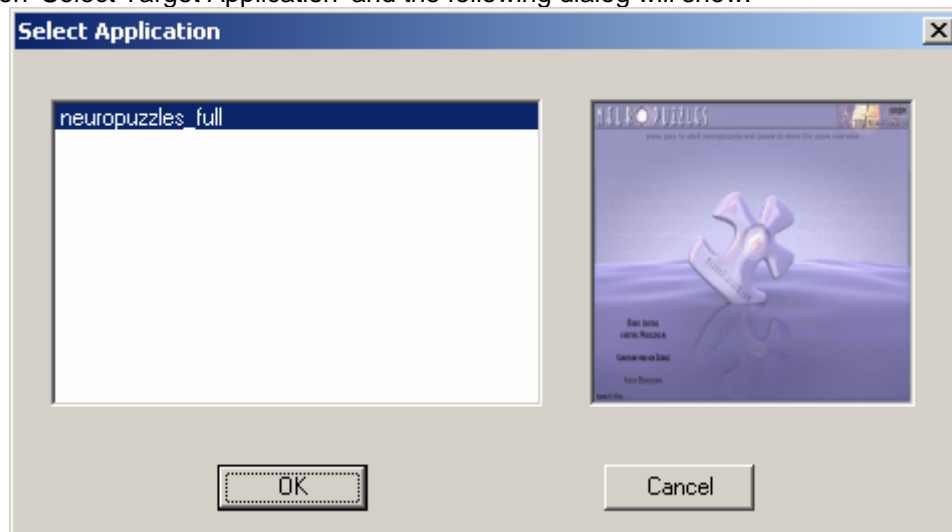
Figure 36 The application selection dialog

Ofcourse you may have more applications installed than just NeuroPuzzles.
Now select neuropuzzles_full and click 'OK'.

You will return to the previous dialog and you can connect the signals.
NeuroPuzzles only requires one signal, which is a Boolean threshold. Update your settings
similar to the settings shown below.

Figure 37 The connection settings dialog

If you wish you can select 'Run Target Application on Start Session'.

Done!

9 Troubleshooting

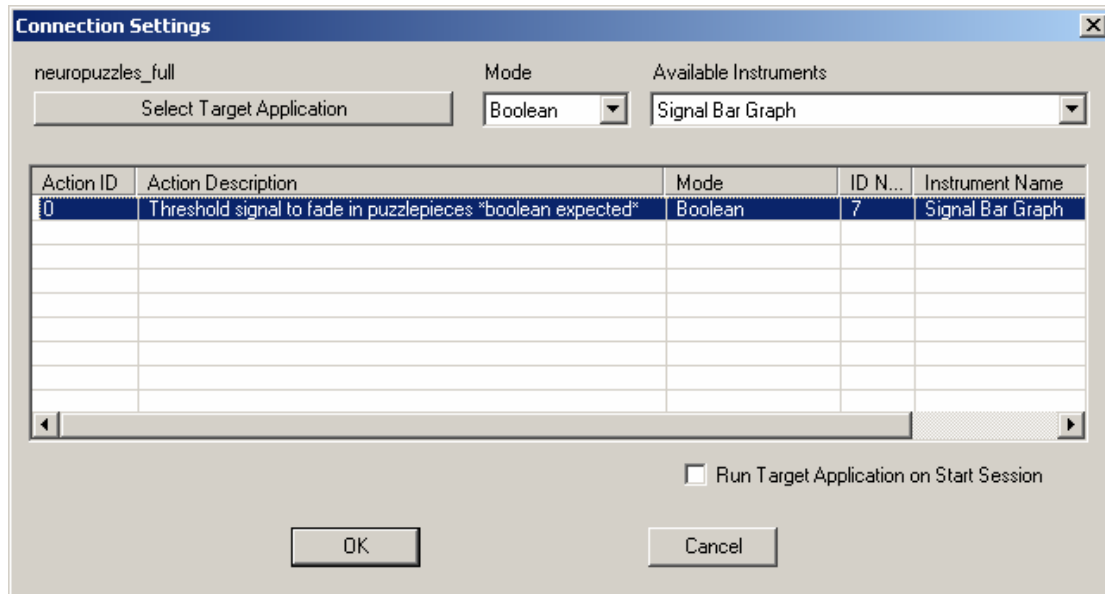| Q:	Does this product run in Vista?
A:	It seems installation might break down with an error code 2738. This is a vbscript.dll error that occurs only when trying to install the game on Vista (on some pc's). It is a known issue on Vista (try googling for Vista error 2738). Please try the following: • Start button -> All Programs -> Accessories -> Right click on Command Prompt, select Run as administrator' • You should be in directory C:\Windows\System32 • Type regsvr32 vbscript.dll (enter) • You should get a message box saying DLL has been registered • Run the installer again.

Q:	I ran into a problem installing the game, what can be wrong?
A:	• Please make sure you have administrator rights, if you are not sure, simply run the installer, it will notify you. • Make sure you are running Windows 98 SE or higher • Accept the license agreement. Scroll down the license agreement, select 'I accept' and press next • Enter a valid serial number. Please enter your serial number carefully, the serial number is case sensitive, and should be entered as shown on the inside of the box.

Q:	The game does not work. What is the first thing I should do?
A:	Check your versions: • BioExplorer version 1.3 or BioGraph 5+ • Flash Player version 8 or higher • The Flash player can be installed from CD, by running the NeuroPuzzles installer again, or by visiting the Adobe website.

Q:	If I run BioExplorer and open the default design, I see a black square where the puzzle game should appear.
A:	Make sure you update to the latest version of BioExplorer (this one includes flash objects).NeuroPuzzles requires BioExplorer 1.3 or higher.

Q:	I do hear sounds, but no puzzle pieces are showing?
A:	• Reload the design • Make sure the design is set up correctly (refer to the manual and the default design). If you are seeing a black canvas, and not the standard NeuroFlasher purple, the game might not be running at all. This is generally caused by using a BioExplorer version older than 1.3. In that case you should update your BioExplorer version. This is described above.

Q:	The game is showing black squares, black puzzle pieces and other random artifacts, is this normal?

A:	No, you can refer to our screenshots to see what the game should look like. The symptoms you describe have a number of possible causes:
	• Verify you have BioExplorer 1.3 or higher or BioGraph 5+
	• If possible run BioExplorer on 2 monitors instead of one
	• Minimize and maximize the screen
	• Make sure you have the correct Flash Player installed. The game requires Flash Player 8 or higher. To check your version:
	    o Right-click anywhere on the game
	    o While the BioExplorer popup menu is visible, click the alt key, this will trigger the default Flash menu
	    o Check the line 'About Adobe … ' / 'About Macromedia …' that line will

	contain a version number. It should be 8 or higher • Reinstall the flash player

Q:	I see black puzzle pieces, is this what the game should look like?
A:	No, the puzzle pieces should be in full color. This is caused by an outdated Flash Player; you need at least version 8.

Q:	The game is running slowly, what could be wrong?
A:	This could be a system requirements issue or a reward issue. If your system has become sluggish i.e. non-responsive it is probably a system requirements issue. In that case, you can try one or more the following: • make sure you meet the minimum and if possible the preferred system requirements. • reload the design • restart your host program • restart your computer • if it is a reward issue, in other words, too few puzzle pieces are being awarded, you should alter the reward scheme by adjusting the bars on the thresholds.

Q:	I installed the game, ran the test page, but it opens in notepad (or another program than my browser), shouldn't it open in a browser?
A:	You might not have a browser installed, please verify you have Microsoft Internet Explorer or another browser. • Browse to your NeuroFlasher directory, where you will find the index.html file. • Right-click (on some system you must hold ctrl or shift) on the index.html file and choose the option: Open With…. • From this menu, choose 'Choose program'. A list will show, select Internet Explorer and check the 'Always use the selected program to open this kind of file' option. • Click OK. • Note that this is only required to either run the test page, or install the latest Flash Player over the web. You do not need to have Internet Explorer to actually run the game in BioExplorer, and you can always install the Flash Player from the accompanying CD-rom, or by rerunning the installer.

For an up to date overview of questions, issues and possible answers please visit our website at:

http://www.neuroflasher.com/main/index.php?option=com_simplefaq

10 About NeuroFlasher

10.1 Our mission

Our mission is to contribute to the development of high quality, motivating games for the neurofeedback practice, for both clients and therapists.

In this sense, high quality means:
- user-friendly software, with extensive instructions,
- clear learning goals for the client,
- offering variety, but not too distracting and
- support in the form of a website with helpdesk
- ready & able to improve and develop new software through your feedback

We hope you'll experience our products and services this way, if not, please feel free to contact us through our website.

NeuroFlasher is a company that combines in-depth software and multimedia knowledge with psychological, pedagogical and educational knowledge. NeuroFlasher has extensive experience with neurofeedback training in practice and moves within a network of experts and therapists in all fields described above.

10.2 Contact us

Contact us through our website: www.NeuroFlasher.com

10.3 Register!

Register today in order to stay up to date with our new products. Registration is simple, if you already have an online account on our website, you are already registered. If not, just send us an email with your name, email and registration number and we will create an account for you.

11 Disclaimer

This game is meant as an educational and motivational training-interface. It's NOT possible to use the game for diagnostic or medical treatment. When using the game, you should be a well-educated neurofeedback trainer yourself, or be in the presence of one.

For more information please refer to our license agreement that came with this game.

12 Adobe™ Flash™ Player redistribution license

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