AUDIVA

Hearing and Moving

Operating Instructions

"Brain-Fit home"

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Introduction

The 'Brain-Fit home' - BFH for short - is a multi-function device. It enables 7 different functions of aural (A) and, to some extent, visual (V) perception to be tested and trained:

• Order threshold lateral [Ol] A, V , Au/Vi-im, Au+Vi

The lateral order sensitivity threshold is the shortest interval between 2 stimuli that the user of the device needs in order to recognise clearly which of two stimuli (coming from left or right) was created first. The aim is to train the user's aural and/or visual sense of order and to get the threshold speed for achieving this is as low as possible.
Problem posed to test subjects:
Did the first click come from the left or the right? Press the button on the side on which you noticed the first of the 2 stimuli.

• Fusion threshold [F] A, V, Au/Vi-im, Au+Vi

The fusion threshold is the shortest unit of time that has to elapse in order for two stimuli to be just about still perceived as two stimuli rather than one 'fused' stimulus.
Problem posed to test subjects:
Did you hear one or two clicks? Press the left button if you noticed one stimulus, and the right button if you noticed two.

• Intermodality [I] A...V / V...A

This test seeks to find the shortest time that has to elapse between stimuli of two different modes in order for the modality of the first stimulus to remain clearly distinguishable.
Problem posed to test subjects:
Pay close attention to whether the light or the click comes first. Press the left button if you heard the click first, or the right one if you saw the light first.

• Synchronicity [S] A, V, Au/Vi-im, Au+Vi

This test seeks to get test subjects pressing the buttons as closely as possible 'in sync' with guide beats from left and right ('finger-tapping'). ou are provided with 3 different procedures for running this test. See page 10.
Problem posed to test subjects:
You will hear clicks alternating from left and right. Press the left and right buttons as closely as you can in time with the clicks.

• Order threshold serial [Os] A

Like the order threshold lateral, but this time involving both ears with a serial sequence of differing stimuli (tone-click or click-tone).
Problem posed to test subjects:
Pay close attention to the sequence of tones and clicks. Press the left button if you heard the click first, or the right one if you heard the tone first.

• Pitch differentiation [P] A

1. The simplest test: [equal/unequal]. This involves either two tones of the same pitch, or two of different pitches.
2. In this procedure [higher 1./2.] two tones are generated and the test subject has to recognise which tone was higher, the first or the second.

3. In this procedure [higher 1./2./3.] 3 tones are generated and the task is to recognise whether the higher-pitched tone was first, last or in the middle. If the higher-pitched tone is in the middle, both buttons (left an right) should be pressed simultaneously.
Problem posed to test subjects:
1. Press the left button if you heard two tones with the same pitch, or right if you heard two different tones.
2. Press the left button if you heard the higher-pitched tone first, or the right button if you heard the higher-pitched tone last.
3. Press the left button if you heard the higher-pitched tone first, the left and right buttons simultaneously if you heard the higher tone in the middle, or the right button if you heard the higher-pitched tone last.

• Directional hearing [D] A

2 clicks are fed to the test subject's ears a few µs apart. The test subject's perception of direction is tested by identifying in which ear the click first began. Subjects hear only one click, however it comes more from either the left or the right.
Problem posed to test subjects:
Did the click come more from the left or the right? Press the left button if you heard the click more on the left, or the right button if you heard more of the click on the right.

Applications:

The 'Brain-Fit home' as a training device:
For promoting:
- perception (all procedures),
- left-right attribution (Ol, R),
- auditory sequencing (Os) and audio-visual sequencing (I),
- aural/visual-motor coordination (S),
- faster processing of aural/visual stimuli (all procedures)
- equal division of attention to aural and visual stimuli (I)
- directional hearing in the horizontal plane (D)
- pitch differentiation (P)

The 'Brain-Fit home' as a test device:
The training functions described above can also be used for testing purposes. You should be aware, however, that the performance of test subjects is dependent on their levels of attention and concentration, and on their physical ability to perform the required functions by pressing the buttons. You are shown a evaluation at the end of each test. See page 17.

For your safety:

Pay attention to rules of use:

The 'Brain-Fit home' must be used only for the functions listed under 'Applications'. Do not allow the device or accessories to come into contact with water or solvents. The device should be cleaned with a damp cloth. The equipment should not be used in the immediate vicinity of mobile phones, radios or transmitting masts.

Neurological sensitivity:

Although to date no such case has come to light, we offer the following advice for safety purposes:
If the subject suffers, or has in the past suffered, from epileptic fits or other seizures, the tests or training should be performed with great care, in discussion with the subject's doctor. It is well known that visual sti-

muli, in particular, can trigger such an attack if the patient is sensitive to such things. There is far less risk of such reactions from aural stimuli, as has been confirmed to us by specialist medical advice.

Preamble

Foreword

Although much has been said about loud music, solo computer and video games and the proliferation of TV sets around the home, in this day and age, it is impossible to imagine children's bedrooms without such things. But it has been proven that not all of these games have a negative effect on children. Some can even have 'positive' effects. You can test this for yourself with the 'Brain-Fit home'. You will be able to prove to yourself that some children perform better (even above average) in visual tests (OI, F) than in similar aural tests.

Most modern computer games are designed to be played alone. Precocious visual skills that result from playing such games can often be combined with under-developed aural talents. And it is aural stimuli on which the 'Brain-Fit home' puts the emphasis. Regular training with the 'Brain-Fit home' can gradually ensure that a person's aural skills come up to scratch with their visual abilities.

But that's not all: reacting quickly to complex situations, as done when playing almost every computer game, produces stress and reduces the player's ability to concentrate on individual situations for any prolonged period. It is possible to see a link between such concentration difficulties and motor restlessness (hypersensitivity). Children affected by such problems find it more difficult to be creative and to give expression to their emerging personalities. Often, they simply mirror the actions of their favourite computer game.

The 'Brain-Fit home' procedures call not for immediate, but rather for considered reaction! (With the exception of the synchronicity test).

A child playing with the 'Brain-Fit home' has to concentrate on just one task at a time. Every one of the 'games' on the 'Brain-Fit home' both demands and trains concentration and attention! To ensure that the training games on the 'Brain-Fit home' are fun to play, we have built in a system of playing modes that can be selected for levels of difficulty, graded as 'Beginner', 'Advanced', 'Pro' and 'Master'. Try it out for yourself and discover your own limits!

A number of frequently updated scientific works on AUDIVA's various training methods are available for downloading free of charge at www.audiva.de (german language) or try at www.audiva.org for english versions.

There is also a book that we would strongly recommend you read. This german book has been the catalyst for many initiatives in this field: Ernst Pöppel, Limits of Consciousness (Grenzen des Bewußtseins), ISBN 3421 02735 8 (for english papers search for „Ernst Pöppel", „v. Steinbüchel" and „Burkard Fischer").

Training in 'game' mode:

In 'game' function, the Brain-Fit home enables a particularly comprehensive training routine to be carried out in all of the BFH's 7 modes in just 7 minutes. One minute is spent on each mode. The objective is to get the starting speed (or value) for each test down by a half within 1 minute. To this end, a points system has been developed:

- plus points are awarded for every correct response to a stimulus, and minus points for every wrong response.
- if you're playing in 'pro' game-mode, you get more points than if you're playing in 'beginner' game-mode.
- if the player gets to half of the starting value, 200 extra points are awarded.
- if half of the relevant starting value if achieved before 1 minute has elapsed, then additional time points are awarded and the player moves on automatically to the next game with the next mode.

- if half of the starting value is not achieved with one minute, the game is automatically terminated and the player moves on automatically to the next game with the next mode.

More features of 'game' mode:

- the current points total is displayed after every response.
- the game can be terminated at any time and continued later.
- the highest score (the best total in the device across all 7 operating modes) is displayed at the end. The player thus knows if he/she has improved.
- the highest score is also kept separately for each of the 7 operating modes. You are thus able to compare performances in the different areas (only available via the global score feature: see page 16).

4 levels of difficulty can be selected in 'game' feature: 'Beginner', 'Advanced', 'Pro' and 'Master'. Each category has a correspondingly difficult starting speed or value, so that there's a challenge in it for everyone. To select the level you want, go to [Settings] and choose between [- normal -] and [game: beginner/advance/pro/master].

Training in 'normal' mode:

How to work out the right starting speed or value:

For example, for lateral order threshold [Ol] procedures

First set a starting speed of e.g. 300 ms on the device and begin the procedure. If the test subject produces 5 correct responses in a row, without pausing much for thought, stop the process by pressing the middle button and set a faster starting speed of 200 ms. If the test subject again produces correct responses one after the other, the process should again be ended and restarted once more with an even faster starting speed. This should be repeated until you get to a starting speed at which the test subject pauses at length and/or chooses the wrong response. The subsequent training exercise should then be begun using the next slowest starting speed.

Use this same process of trial and error for working out starting speeds/values for all 'Brain-Fit home' functions.

Notes on order threshold lateral [Ol] training:

You should first attempt to ascertain the subject's current levels of order threshold. If such a pre-test has already been done by the subject's doctor or therapist, you can immediately begin the standard or shortened training course, as described below.

If the subject's order thresholds are not known, you should initially start by testing a variety of different starting speeds. To do so, you should select the operating mode for the subject's weaker sense, usually aural, and activate the 'Confirmation'.

Standard Order threshold training process:

Training should first be done on the subject's aural sensitivity (set device to: "Stimuli: Aural"). Training should then be done on visual sensitivity (set to: "Stimuli: Visual"). Finally, if the subject's aural and visual senses are equally good, training should be done on the individual's combined aural/visual order thresholds by alternating use of both modes (with the device set to: "Stimuli: Au/Vi-im").

In this way, training is provided for more than just the subject's aural and visual order thresholds. The subject also receives training in equally dividing attention between aural and visual stimuli. The training session should be continued, until the subject's reaction speeds begin to get worse. This is a clear sign of tiredness and falling levels of attention.

Order threshold lateral (Ol) - 'Brain-Fit home' training features:

If the subject has a short concentration span, it may be desirable to limit the duration of the training process. In order to do this, the subject's aural sensory system can be trained at the same time as his/her visual senses. The device supports this through a special process. In this process, the device generates aural sensory

stimuli 40 ms before it generates visual stimuli. The setting for this process is "Stimuli: Au+Vi". With the device on this setting, aural stimuli will always be generated somewhat (40 ms) ahead of visual ones. In this way, a subject might, for example, do sensory training using this setting for five days, and then on the 6th day use the "Stimuli: Aural" setting to see whether he/she could then reach the same top speed with aural stimuli alone.

Connecting the device and getting started:

Unpacking

The following are included in the box: the 'Brain-Fit home'; a pair of headphones; a charger (9V power supply); and these instructions.

First steps

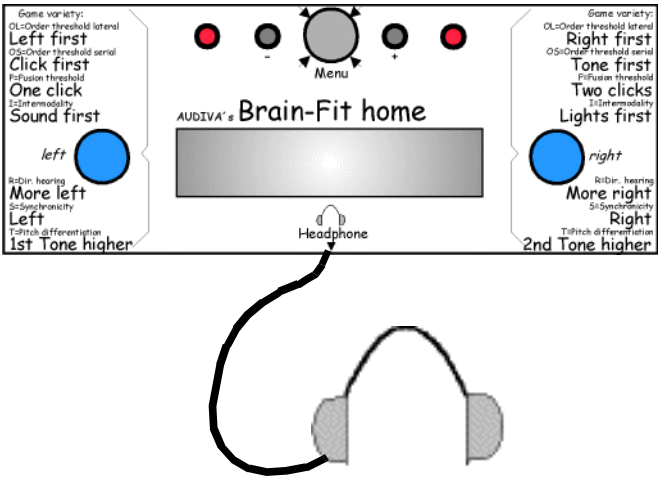
Press the middle button, marked 'Menu'. This is the 'On switch':

- if you press this button briefly, the name and version of your 'Brain-Fit home' appear one after the other in the display.
- if you press the button and hold it down, the device immediately runs a memory check and then goes into operating mode.

The display now shows the last base function to have been selected. By pressing the middle button, you can now work your way via a number of settings to your desired starting point. See 'Menu system' table on the next page.

- If your 'Brain-Fit home' is brand new, or if it has been in use for some time, it is possible that the message 'Recharge battery' will now appear and that the device will switch itself off (see page 15).
- If you want to do aural work, plug the headphones into the socket below the display and put them on the right way round.
- If you don't touch any of the buttons for more than a minute, the device will switch itself off automatically.

Illustration of the device and headphones:



Operation:

After turning the device on, or at the end of an assessment routine, you will find yourself in one of the following fields. Here are the operating modes:

- Order threshold lateral [Ol]
- Fusion threshold [F]
- Intermodality [I]
- Synchronicity [S]
- Order threshold serial [Os]
- Pitch differentiation [P]
- Directional hearing [D]
- Basic settings (apply to all modes of operation)

Can be set using the +/- buttons. See table on the next page.

Basic settings apply to all modes of operation:

- Confirmation on/off ll Repetition on/off ll Test time unlimited, 1-60 minutes ll Language D/E ll Normal/game: Beginner, advance, pro and master

What the buttons do:

❸ Menu button: jumps you from field to field within a function

❷❹ +/- buttons: lets you set values and change a function

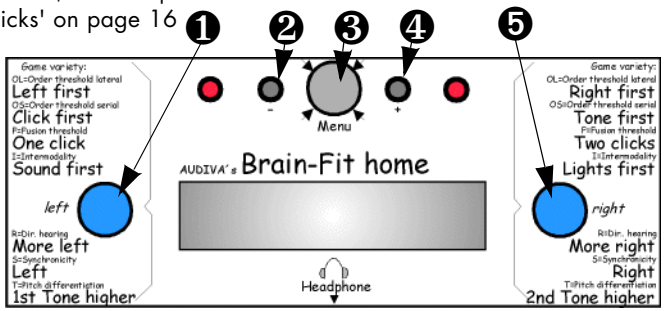
❺ Right response button:

- used to start manual operation, if [...Start ?] is showing in the display
- used to start a game, if [game: ...] is showing in the display
- used to switch to R (right) in volume setting mode
- before you have startet, pressing it produces a single test stimulus
- after you have startet, it is a response to a stimulus and initiates the next stimulus

❶ Left response button:

- used if you do not want to start manual operation when [...Start ?] is showing in the display; takes you back to the base function.
- used if you do not want to start a game when [game: ...] is showing in the display; takes you back to the base function.
- used to switch to L (left) in volume setting mode
- before you have startet, pressing it produces a single test stimulus
- after you have startet, it is a response to a stimulus and initiates the next stimulus

See also 'Button tricks' on page 16



Menu system

	Main function + button ↓	Field: Procedure + button ↓	Field: Start value + button ↓	Field: Stimuli + button ↓	Field: Volume + button ↓	Field: Start ?	
Menu button →	Ol-Ord. thres. lateral	O- approxi-mate O- percent steps	250/500 ms 50-950 ms	Stimuli: auditory, visual, au/vi-im, au+vi	Vol.: L 1-15 / R 1-15	Ol-Start ?	no: left button Yes: right button
Menu button →	F-Fusion thresh.	F-percent steps	1-500 ms	Stimuli: auditory, visual, au/vi-im, au+vi	Vol.: L 1-15 / R 1-15	F-Start ?	no: left button Yes: right button
Menu button →	I-Intermodality	I- approximate I- percent steps	250/500 ms 50-950 ms	-always auditory / visual-	Vol.: L 1-15 / R 1-15	I-Start ?	no: left button Yes: right button
Menu button →	S-synchronity	S- constant S- variable S- intermittent	150-950 ms	Stimuli: auditory, visual, au/vi-im, au+vi	Vol.: L 1-15 / R 1-15	S-Start ?	no: left button Yes: right button
Menu button →	Os-Ord. thres. serial	O- approxi-mate O- percent steps	250/500 ms 50-950 ms	-always auditory-	Vol.: L 1-15 / R 1-15	Os-Start ?	no: left button Yes: right button
Menu button →	P-Pitch	P-equal/ unequ. P-higher 1./2. P-high. 1./2./3.	1-24 ST (Semi Tones)	-always auditory-	Vol.: L 1-15 / R 1-15	P-Start ?	no: left button Yes: right button
Menu button →	D-directional Hearing	D- approxi-mate D- percent steps	250/500 µs 50-950 µs	-always auditory-	Vol.: L 1-15 / R 1-15	D-Start ?	no: left button Yes: right button
Menu button →	Basic settings	confirmation: on/off	Repetition: on/off	Test time: unli-mit or 1-60 min	Sprache/ langu. D/E D=German E=English	- normal - game: - beginner - advance - pro - master	→ Back → Start game: right button
	- button ↑	**- button ↑**	**- button ↑**	**- button ↑**	**- button ↑**		

Operating procedures

Display [... approximate], see table
Operating procedure for step-by-step approximation of each threshold value.

- If a subject responds correctly to at least 8 out of 10 stimuli (80%), the interval between the next 10 stimuli will be halved. If the subject again responds correctly to 80%, the interval between stimuli will be halved again. If the subject responds correctly to less than 80%, the interval used for the next 10 stimuli will be the average of the last and last-but-one intervals.
- For example: Begin at 500. 80% is achieved. Continue at 250. If less than 80% is then achieved, continue at 375.
- Automatic termination: as the steps used in this procedure get continually smaller, the process is automatically ended if the size of the step falls below 10 (ms or µs, depending on operating mode).
- When operating in this way, the evaluation feature displays the best value as the block of 10 stimuli with the smallest intervals to which the subject responded correctly.

Display [... percent steps], see table
Operating procedure for percentage steps of each threshold value.

- If the subject responds correctly to a stimulus, the interval for the next stimulus is narrowed by 5%. If the response is wrong, the interval is increased by 20%. In this way, whenever the subject gives a correct response a smaller interval between stimuli is automatically triggered. As this mode works in small steps, it makes sense to start by using this operating procedure.
- When operating in this way, the evaluation feature displays the best value as the smallest interval between stimuli to which the subject responded correctly.

Synchronicity (S)

Display [S - constant], see table. Only when 'synchronicity' is selected.

- this is a particularly easy mode for beginners. In this mode, the tempo of the beat does not change.

Display [S - variable], see table. Only when 'synchronicity' is selected.

- The tempo of the beat gets quicker if the buttons are pressed in time with the stimuli, and slower if the buttons are pressed out of step with the stimuli.

Display [S - intermittent], see table. Only when 'synchronicity' is selected.

- In this mode too, the tempo of the beat remains constant. After a while, however, the stimuli cut out, prompting the subject to carry on with the rhythm from memory. If he/she deviates from the beat, the stimuli are turned back on.

Pitch (P)

Possible with or without headphones, as tones are also produced from the device itself.
Display [P - equal/unequal], see table. Only when 'pitch' is selected.

- The simplest mode. In this mode, the device produces either two tones of the same pitch or two of different pitch.

Display [P - higher 1./2.], see table. Only when 'pitch' is selected.

- Two tones are produced, and the subject has to tell which of these was the higher - the first (left button), or the second (right button).

Display [P - higher 1./2./3.], see table. Only when 'pitch' is selected (repetition not possible).

- In this mode, 3 tones are produced and the task is to identify whether the higher of these came first (left button), in the middle (left and right button simultaneously), or last (right button). If the higher tone is the

middle one, both response buttons should be pressed simultaneously (suitable only for physically dexterous subjects).

Starting values

Display [start val: ...], see table
The starting value determines the level of difficulty to be used at the start of the test or training process. Select the starting value so that the subject can respond successfully at the start of the process. (The starting value should be above the subject's existing threshold).
Note:

- In the approximation mode the starting value can be 500 ms/µs or 250 ms/µs.
- In the percentage steps mode the starting value can be set from 50 ms/µs to 950 ms/µs (in steps of 50 ms/µs)
- In pitch differentiation mode the starting value is given in semitones from 1-24 st.

Stimuli output

Display [Stimuli: auditory, visual, au/vi-im, au+vi], see table
This is where you decide whether you want to work on eyes and ears separately or together. The training process is easiest if eyes and ears are stimulated together (Au+Vi), and hardest if they are alternately stimulated in random fashion (Au/Vi-im). For tests, you should always test auditory and visual reactions separately.

- Auditory: targets ears only. Headphones required (be sure to put them on the right way round).
- Visual: targets eyes only. No headphones.
- Au/Vi-im: targets a mixture of both eyes and ears. The device decides at random whether to produce an aural or a visual stimulus. This is the most difficult mode, as in addition to performing the relevant task the subject is also faced with changing modes of stimuli. This sort of training is ideal for use as advanced training for experienced subjects. Headphones are again required.
- Au+Vi: addresses eyes and ears together. In lateral order sensitivity threshold mode (Ol), a special programme addresses the first ear 40 ms before the first eye. This time delay ensures that the aural stimulus is the first to reach the many children who have good visual skills, but who nevertheless have hearing problems. Headphones required (be sure to put them on the right way round).

Volume

Display [Vol L 1...15 / R 1...15], see table
Headphone volume can be set separately for right and left ears, at levels of 1 to 15. You switch between right and left by pressing the right or left response button with the _ (underline) symbol under the figure for the corresponding side. When you do this, a test stimulus is produced as a check. You can then change the level with the +/- buttons.
Note:

- The headphones provided should used at volume levels 12-15.
- Many other headphones (e.g. Sennheiser HDxxx) only need volume levels of 1-2!
- In pitch differentiation mode (P) and serial order sensitivity threshold mode (Os) the use of longer tones gives the impression of higher volume. The BFH takes this into account and correspondingly softens the tone. In these modes, levels 1 to 11 are consequently always the same volume.

Start ?

Display [... Start ?], see table

- Start: press the right response button
- Look at previous evaluation: press the menu button
- Return to start of settings: press the left response button

Terminate process / Look at previous evaluation:
When carrying out tests or training exercises, if you have entered a test time of at least 1 minute, the process will come to an automatic end. You can also manually terminate the process at any time by using the menu button. The evaluation is then automatically displayed. See page 17.

Confirmation - basic setting

Display [Confirmation: on/off], see 'basic settings' in the table
When confirmation is on, both lights come on and remain lit until the relevant response button is released again. Many users find this a source of motivation. By holding the button down, they can prolong the confirmation display. Using the letters W/F (W=true/F=false), the display always shows the last response.

Repetition - basic setting

Display [Repetition: on/off], see 'basic settings' in the table
When repetition is on, the last stimulus is repeated if both buttons are pressed simultaneously (within 20 ms). The number of repetitions required by the subject can be seen in his/her evaluation.
Note: in pitch mode (P) both buttons are pressed simultaneously in the three-choice process [P-1st/2nd/3nd is higher] to give the answer 'the 2nd tone was the higher'. The repetition function is therefore not available in this mode.

Test time - basic setting

Display [Test time: unlimited/1-60 mins.], see 'basic settings' in the table
The test time starts running as soon as you begin a test or training routine. When time runs out, the test or training exercise is automatically terminated and the evaluation is displayed. You can, of course, also end the process manually before that point (by use of the menu button). If you have set [Test time: unlimited], this function is deactivated.
Note: at the end of a game, test time is always set to [Test time: unlimited]. If you want a fixed time, you must set this manually.

Language - basic setting

Display [Language: D/E], see 'basic settings' in the table
Set to D (German) or E (English) so that all text appears in this language.

'Normal' or 'Game' - basic setting

Display [- normal -], [game: beginner/advance/pro/master], see 'basic settings' in the table
With the device set to [- normal -], you can use all of the base functions individually and run tests or perform training exercises in just one base function. The evaluation produced at the end of the process gives you a summary of the performance levels achieved.
With the device set to [game: ...] training routines for each of the 7 base functions are run one after the other. In this mode, no evaluation is given at the end. The job is to collect as many points as possible. You will see a score. See also page 5.
N.B.:

- All work in 'game' mode is on aural senses! The 'stimuli' setting has no effect in this mode.
- Volume must be set before playing games, using the normal mode!

- The basic settings [Confirmation: on/off] and [Repetition: on/off] are available to you in this mode.
- The 'test time' basic setting has no significance in this mode. Each of the 7 BFH functions is run for 1 minute. When the mode is changed from 'game' mode to 'normal' operation, the 'test time' switches to 'unlimited'.

Useful notes:

1. The left/right button markings on the device match the sequence in 'game' mode. This makes it easier for you to switch quickly between internal base functions.
2. After each of the 7 base function routines - i.e. after a maximum of 1 minute - the display reads [next part?]. This gives you time to prepare for the next section and to take a bit of a breather. If the device switches itself off automatically for any reason during this process, you can pick up where you left off when you switch it back on.

See table:

Game mode operating sequence:

	Beginner	Advance	Pro	Master
1. Order threshold lateral [Ol]	Did you hear the click first on the left or right? Press the button on the side on which noticed the first of the 2 stimuli.			
	Procedure: percentage Starting value: 500 ms	Procedure: percentage Starting value: 250 ms	Procedure: percentage Starting value: 100 ms	Procedure: percentage Starting value: 50 ms
2. Order threshold serial [Os]	Listen out for a series of tones and clicks. Press the left button if you hear the click first, and the right button if you hear the tone first.			
	Procedure: percentage Starting value: 500 ms	Procedure: percentage Starting value: 250 ms	Procedure: percentage Starting value: 100 ms	Procedure: percentage Starting value: 50 ms
3. Fusion threshold [F]	Did you hear one click or two? Press the left button if you noticed one stimulus, and the right button if you noticed two stimuli.			
	Procedure: percentage Starting value: 25 ms	Procedure: percentage Starting value: 15 ms	Procedure: percentage Starting value: 8 ms	Procedure: percentage Starting value: 4 ms
4. Intermodality [I]	Note carefully whether the light or the click comes first. Press the left button if you noticed the click first, and the right button if you noticed the light first.			
	Procedure: percentage Starting value: 500 ms	Procedure: percentage Starting value: 250 ms	Procedure: percentage Starting value: 100 ms	Procedure: percentage Starting value: 50 ms
5. Directional hearing [D]	Did the click come more from the left or the right? Press the left button if you heard more of the click from the left, and the right button if you heard more of the click from the right.			
	Procedure: percentage Starting value: 500 µs	Procedure: percentage Starting value: 400 µs	Procedure: percentage Starting value: 300 µs	Procedure: percentage Starting value: 200 µs
6. Synchronity [S]	You will alternately hear clicks on the left and right. Press the left and right buttons as precisely as you can in rhythm with the clicks. (It's tough to get to the interval down to half the starting speed!)			
	Procedure: variable Starting value: 700 ms	Procedure: variable Starting value: 600 ms	Procedure: variable Starting value: 500 ms	Procedure: variable Starting value: 400 ms
7. Pitch differentiation [P]	Press the left button if you hear the higher tone first, and the right button if you hear the higher tone last.			
	Procedure: P-higher 1./ 2./3. Starting value: 24 ST	Procedure: P-higher 1./ 2./3. Starting value: 12 ST	Procedure: P-higher 1./ 2./3. Starting value: 6 ST	Procedure: P-higher 1./ 2./3. Starting value: 3 ST

Power supply

The device gives a warning before the battery becomes fully discharged. The display briefly reads 'Recharge battery!'. The device then switches itself off automatically. You should now connect the charger to recharge the device.
Leave the charger connected for approx. 10-14 hours. This will fully recharge the internal battery.
Depending on how much you use the device, the rechargeable battery will last for 2-4 years. The battery's useful life is over when it starts to need recharging very quickly after the last charge. If your battery is badly run down, you can continue to use the device by connecting it to the charger. However, you should return the battery to the manufacturer to be renewed (this is a chargeable repair).
When changing batteries, all settings that you have made yourself will be lost and the device will revert to the factory settings.

Trouble-shooting

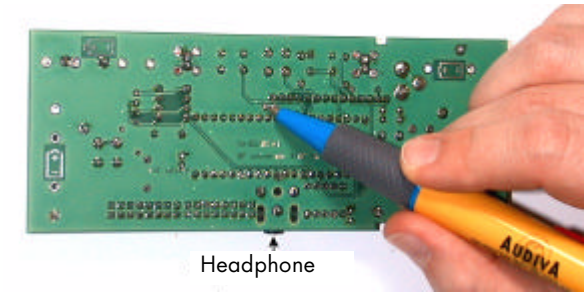
The tone/click can only be heard in one ear (can sometimes also happen when the cable is moved):
The headphones may be faulty. Test the device using another pair of headphones (3.5 mm stereo jack). Only if the problem persists is the device defective. Otherwise, it's the headphones.

Device will not work / battery is suddenly empty:

Connect the charger to recharge the device. Leave the charger connected for approx. 10-14 hours. This will recharge the internal battery (use only the charger provided).
Battery has been charged for several hours, but device fails to work:
Check initially to see if the charger housing warms up after being plugged into a power socket for a few hours.

- If it's cold, the charger is probably faulty.
- If it's warm, then the device has fully discharged (i.e. the battery has become completely empty) before the charging process began.

In this event, pull out the charger's plug and open the case of your BFH. As you do so, separate the two halves of the shell using your fingernails or another pointed object (see picture). Hold the device as shown. When you have opened the top joint, pull both halves apart until the bottom joint also springs open of its own accord (requires a little force).



Turn the device around (i.e. buttons facing down) and lift off the bottom of the case along with the paper inlay. Using a metallic object (e.g. the tip of a ball-point pen), connect the two solder joints on the printed circuit board as shown. This procedure resets the device, which will now immediately start up again. If it doesn't, either the device is faulty or the battery is defective or not charged.

Button tricks

The BFH offers a number of special button combinations to make your work easier:

Switching off (manual)

While in use: first press the menu button; then press the left response button as well; now release the menu button; and, finally release the left response button. (Note: the device switches itself automatically if no buttons are touched for one full minute).

Quick start

With device switched off: press and hold down the menu button until 'Checking memory' appears in the display.

Restore factory settings

With device switched off: first hold down the '-' button, and then press briefly on the menu button. When 'Factory settings' appears in the display, release the '-' button. Any previously recorded highscore will be lost.

Global scores: (only in 'game' mode)

Global scores can be retrieved by pressing the left and right buttons at the same time (either when switching the device on or at the relevant point on the system menu).

Retrieve data on usage numbers and exercise duration

With device switched off: first press and hold in both left and right response buttons; then press the menu button until [xxx uses xxx min] appears in the display. Now release all buttons and read off the displayed values.

- To leave this display without making any changes: briefly press any of the three buttons: menu, '+' or '-'.
- To set the readings to 0 (in preparation for a new test subject): press both the left and right buttons simultaneously. After a brief pause, the display reads [0 uses 0 min].

View highest score

The display now shows [highscore: xxxxx]. Read off the highscore.

- To leave this display without making any changes: briefly press any of the three buttons: menu, '+' or '-'.
- To set the high score to 0: press both the left and right buttons simultaneously. After a brief pause, the display reads [highscore: 0].

View interim score

The display now shows [last part: xxxxx]. This figure cannot be deleted. It shows the points total scored in a game that has been interrupted by switching the device off. You can continue an interrupted game later. You will then be credited with these points.

- To leave this display without making any changes: briefly press any of the three buttons: menu, '+' or '-'.

View game score

The display now shows [score: xxxxx]. Read off the total. This figure cannot be deleted. It shows the points total scored in the last completed game (mostly under the highscore).

- To leave this display without making any changes: briefly press any of the three buttons: menu, '+' or '-'.

View scores one after the other for Ol, F, I, S, Os, P, D (top scores for each individual operating mode)

7 display fields follow, showing you the top score in each of the 7 operating modes. After the final field, you are returned to the normal settings mode.

Evaluation (only in 'normal' mode)

We include the following table as an example of a diagnosis data entry form.

	End value:	Best value:	OK L	OK R	Time m:s	REP L	REP R
Ol-ord. thres. lateral	..... ms	..... ms	..... %	..... %	..... :	.....	.....
	End value:	Best value:	OK E	OK D	Time m:s	REP E	REP D
F-fusion thresh.	..... ms	..... ms	..... %	..... %	..... :	.....	.....
	End value:	Best value:	OK A	OK V	Time m:s	REP A	REP V
I-intermodal.	..... ms	..... ms	..... %	..... %	..... :	.....	.....
	End value:	Best value:	OK L	OK R	Time m:s		
S-synchron.	..... ms	..... ms	..... %	..... %	..... :		
	End value:	Best value:	OK K	OK T	Time m:s	REP K	REP T
Os-ord. thres. serial	..... ms	..... ms	..... %	..... %	..... :	.....	.....
	End value:	Best value:	OK L	OK R	Time m:s	REP L	REP R
P-pitch	..... ST	..... ST	..... %	..... %	..... :	.....	.....
	End value:	Best value:	OK L	OK R	Time m:s	REP L	REP R
D-localization	..... µs	..... µs	..... %	..... %	..... :	.....	.....

End value

[end val.: ...] The value with which the subject finished the process (can be lower than his/her best value, if the last stimulus was responded to correctly before the end).

Best value

[best val.: ...] The best (minimal) value achieved in response to a stimulus to which the correct response was given. If the correct response was never given, no best value is displayed. The best value is an approximation of the subject's threshold level, assuming that the subject has actually reached his/her limit.
The [OK...] percentage figures explained:

- If values of 95-100% are achieved, this indicates that the subject has not yet reached his/her actual threshold. Many failed attempts must be made during a test in order to measure a subject's threshold range correctly (they must be paying attention). The test should be repeated (if necessary, set a lower starting value/interval).
- Values of 50% and less on both sides indicate that the subject has correctly identified the stimuli, but has pressed the buttons the wrong way round. In such cases, the process should be repeated once the subject has been reminded what to do (turn headphones the right way round?).
- Values that vary greatly from one side to the other, e.g. 60% / 90% (or vice versa), indicate that the subject has an inclination to respond more on one side. This may indicate a hearing deficiency, e.g.

significant differences between the subject's two aural canals (applicable only to the Ol and R processes; compare results with dichotic hearing test).

Time:

The time is given in minutes and seconds [.... : ....].

Repetition [RPT...]:

This shows the number of times the process was repeated (by pressing both response button simultaneously). Only, though, if 'Repetition' is set to 'on' in the basic settings.

Notes on test procedures:

Lateral order threshold (Ol):

See page 6

Fusion threshold (F):

Note the comparison between the fusion threshold (F) and order sensitivity thresholds (Ol and Os):
"... the time interval necessary between 2 stimuli in order to for someone to realise that there are two stimuli (Ol/Os and F) AND which of the two is first (Ol/Os).").
With fusion thresholds you are working with very small values. The reading is therefore given to two decimal points. The fusion threshold is therefore cleaner and clearer than the order sensitivity thresholds (you don't have to identify the order of anything).

Intermodality (I):

By alternating between aural and visual stimuli, you can examine in which area the subject is strongest. It thus becomes clear which sensory mode is dominant when the subject's attention is divided, or whether both sensory systems are equally able to assimilate information.

Synchronicity (S) (Research projects):

See the works of Frau Dr. Steinbüchel (Institute for Medical Psychology, Munich) and Prof. Peter Wolff (Harvard University, USA).

Serial order sensitivity threshold (Os):

Differentiating between what comes first, a tone or a click.
The tone is comparable to a vowel. When spoken, vowels are particularly long phonemes and are emitted by the 'Brain-Fit home' as 20 ms tones at 5000 Hz.
The click is comparable to a mid-frequency consonant (e.g. k). The click itself is only 1 ms long. However, the pause (the 'ms' figure used) also belongs to the click. It corresponds to the 'voice onset time' and/or 'voice offset time', i.e. the silent phase of transference from vowel to consonant.

Pitch differentiation (P):

Children with aural perception problems are often less able to tell differences in pitch. This musical ability, however, is also needed for recognising different vowels and prosodic elements of speech. We know from the study of psycho-acoustics that man can tell the difference in variances in frequency of between 1-2%.
The following rule of thumb applies for children: 6-year olds should at least be able to recognise differences of 4 semitones (Dr. H. Rosenkötter, 3rd Workshop Volume). However, a preliminary test must be done to ensure that the child understands what is going on: is the child able to associate the terms 'higher' and 'lower' tone accurately with what he/she hears? If not, suggest 'bright' and 'dark' tones (bright=high/dark=deep).

The smallest unit of frequency that can be represented by the 'Brain-Fit home' is one semitone (= 5.9%). Adults should be able to tell the difference down to this level.

Directional hearing (D):

Bi-aural hearing is made possible by areas of switched neural roots directly behind the cochlea, in which the signals from both ears are tallied. This makes the process very quick. Differences as small as a few thousandths of a second between left and right aural stimuli can give an impression of direction. While the speed of sound is around 330 metres per second, this difference is caused by the diameter of the human head altering this speed very slightly (in the µs range) in relation to each ear.
This is like there being a speaker at the front of a room standing rather to one side, which leads to the speaker's voice reaching one of the listener's ears somewhat earlier than the other ear.

To simulate this, the 'Brain-Fit home' uses precise clicks, which are delivered to both ears. If the two clicks are absolutely simultaneous, we hear the signal in the middle. As the amount by which the clicks are offset reaches around 50 µs, the sense of hearing begins to drift towards the side of the first click. Therefore, for this purpose too, you should begin with an initial offset figure that is big enough for the side from which the stimuli originate to be clearly distinguishable.

Tips:

- If a child has difficulties selecting the right buttons, then these should be pressed by a parent or therapist. The child can simply point to the ear or side that he or she believes to be the right answer.

Technical data:

- Length of click and light impulses in OI/Os/I/S/D processes: 1.0 ms. Working-Ranges: in OI/Os/I/S processes: 1-990 ms; in the F process: 0.1-50 ms; in the P process: 2 octave (48 semitones); in the D process: 10-990 µs. Operating voltage range: 4.5 - 6.5V. Power consumption: 14mA.

Points calculations in 'game' mode:

on [Timepoints]:	all	Score + ((60-used time in seconds) x 10)
on [target reached !]:	all	Score + 200 Points
on answer correct:	[OI]	Score + (950 - actual value)
	[Os]	Score + (950 - actual value)
	[F]	Score + (50.000 - (actual value x1000)) / 1024
	[I]	Score + (950 - actual value)
	[D]	Score + (950 - actual value)
	[S]	Score + (950 - actual value)
	[P]	Score + ((48 - actual value) x 15)
on answer wrong:	[OI]	Score - (950 - actual value)
	[Os]	Score - (950 - actual value)
	[F]	Score - (50.000 - (actual value x1000)) / 1024
	[I]	Score - (950 - actual value)
	[D]	Score - (950 - actual value)
	[S]	Score - (950 - actual value)
	[P]	Score - ((48 - actual value) x 15)

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