

# **AUDIVA**

**Hearing and Moving**

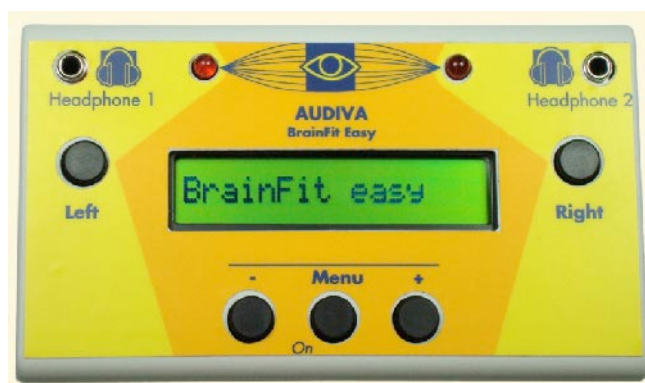
# **The BrainFit**

## **Instructions for**

### **Model No OT 4000**

#### **Screening the Temporal Ordering ability**

- Auditory, Visual and combined Functions
- Use as an assessment indicator tool.
- Use as a training 'game' device.



**Version 3.35**

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Please Note: The BrainFit is intended as a pre and post training or intervention indicator. The designer, manufacturer and their agents do not intend any medical diagnosis or prescription through its use and are therefore unable to accept any responsibility for anyone misusing it. The controlled auditory clicks produced by the device have been found to be safe and effective volume level. If there is any doubt about the suitability of the device for use with a specific individual a qualified medical practitioner should first be consulted. If the individual being assessed or using the game facility as a training tool has a history of epilepsy it is recommended that the visual flashing light mode should only be used in consultation with a suitably qualified medical practitioner.

The BrainFit is a device that can be used with children, juveniles and adults of all ages. For clarity, throughout this Manual the 'individual being assessed' or using the game facility as a training tool will be referred to as 'the child' and the person administrating the process as the 'BF Admin'.

This product is classified as Electrical and Electronic Equipment. Should the time come for you to dispose of this product please ensure that you do so in accordance with the European Waste of Electrical and Electronic Equipment (WEEE) Directive and in compliance with local laws relating to this directive.

English October 2008

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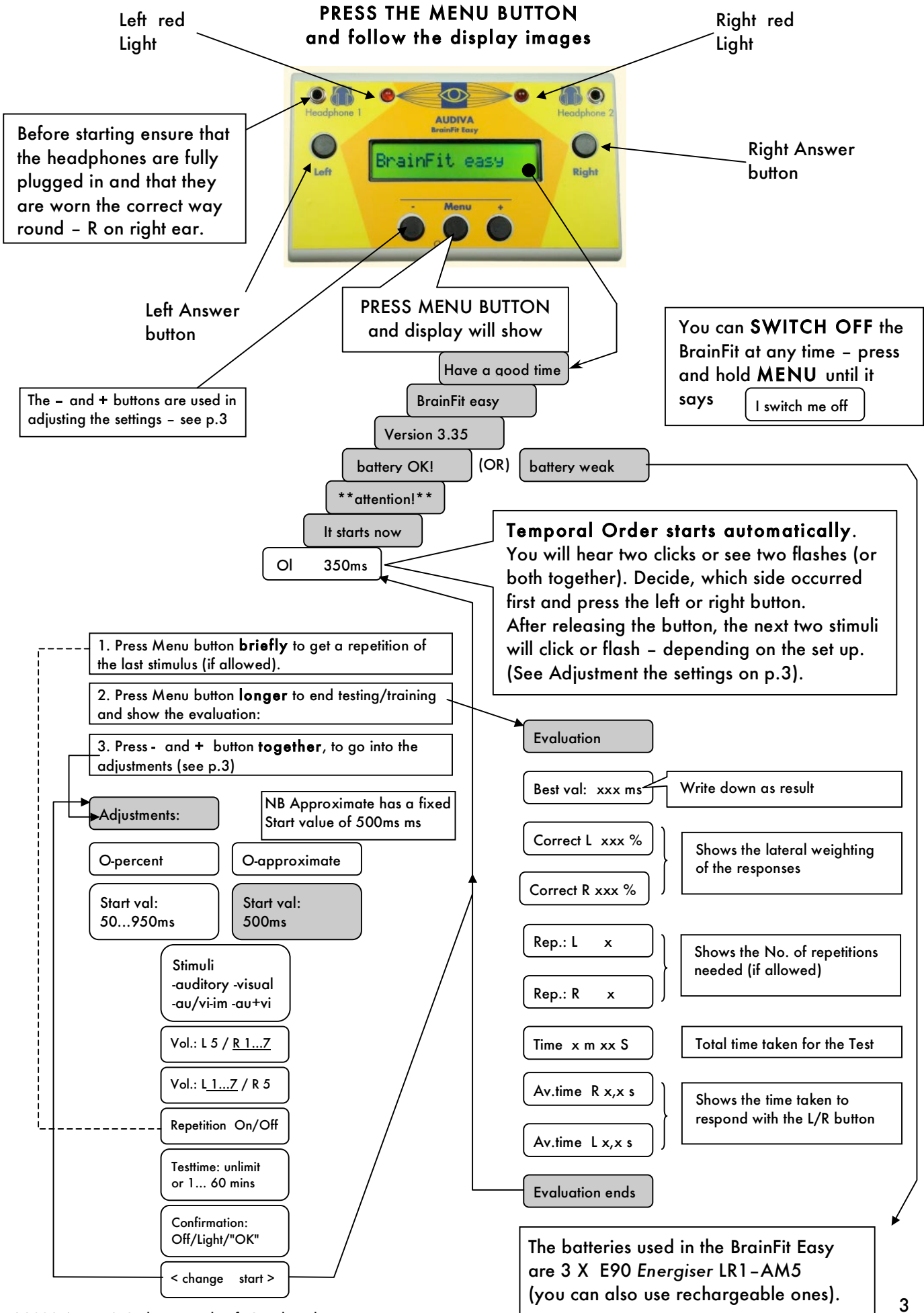
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In the event of scientific or technical advances, we reserve the right to make changes to the product without giving prior notice.

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# GETTING STARTED WITH the Audiva BrainFit:



**To adjust the Settings:-** The different options available are explained on p.3.

To start the BrainFit press the MENU button.

Once it has run through its opening display sequence, press the '-' button and the '+' button simultaneously:-

Display will show



These are the buttons used to make adjustments.

You can **SWITCH OFF** the BrainFit at any time - press and hold **MENU** until it says

I switch me off

Adjustments:

1. Calculation setting:-

Either

O- percent

OR

O-approximate

An easy set up for becoming familiar with the Brain Fit is shown in red.

Press the - button or + button to choose

↓ Press MENU button

2. Start value setting:- If O-approximate:

Start val: 500ms

Only value offered

If O-percent:

From

Start val: 50ms

TO

Start val: 950ms

In 50ms steps

Press the - button or + button to choose

↓ Press MENU button

3. Stimuli setting:-

Either

Stimuli auditory

OR

Stimuli visual

OR

Stimuli au/vi-im

OR

Stimuli au+vi

Press the - button or + button to choose

↓ Press MENU button

4. Volume setting:-

Vol.: L 5 / R 5

Choose from: 1 - 7 in steps of 1

Press the - button or + button to choose

Sets R ear first / MENU / then L ear

↓ Press MENU button

5. Repetition setting:-

Either

Repetition: Off

OR

Repetition: On

Press the - button or + button to choose

↓ Press MENU button

6. Test time setting:-

Testtime mins 15

Choose from: unlimit or 1 - 60mins

Press the - button or + button to choose

↓ Press MENU button

7. Confirmation setting:-

Either

Confirm. Off

OR

Confirm. Lights

OR

Confirm. "OK!"

Press the - button or + button to choose

↓ Press MENU button

Goes back to the top of this page.

Press Left

<change start>

Press Right

Starts the test / game.

### Operation Settings Available:

The BrainFit allows for different operation, evaluation and display options to match the needs of each individual learner to maintain sufficient challenge and achievement to encourage them to continue. Details of how to select the appropriate setting are shown on p. 3 'Adjusting the Operation Settings'. On this page are explanations of each setting option:-

- 1. Calculation setting:** Determines which of the pre-programmed formulae the BrainFit will use to adjust the time between the stimuli during the session. Choose between:-

  - Approximate** There will be 10 pairs of stimuli per level.  
If 8 out of the 10 were correct, the time between the stimuli will be reduced by half. If less than 8 answers were correct, the time between the stimuli will be increased to midway between the actual and last time. This approximates to the child's achievable time between stimuli.
  - Percent** A re-calculation of time between stimuli after evaluation of each response.  
Correct answer: time between stimuli decreases by at least 5% (minimum 1ms).  
Wrong answer: time between stimuli increases by 20% (minimum 1ms).
  
- 2. Start Value setting:** Decides the time between stimuli (whether clicks or lights) that the BrainFit will use to start the session.  
The options offered are dictated by the Calculation option selected above.

  - If Approximate The start value is always 500ms.
  - If Percent The choice is from 50ms up to 950ms in 50ms steps.
  
- 3. Stimuli setting:** Allows the choice of the input sense(s) that the BrainFit will stimulate. Choose from:-

  - auditory: i.e. clicks through the headphones, one to each ear.
  - visual: i.e. two red light flashes.
  - aud / vis: i.e. clicks or red light flashes in randomly changing order.
  - aud + vis: i.e. both clicks and red light flashes (with clicks 40ms before red lights).
  
- 4. Volume setting:** Allows for the adjustment of the volume of the clicks, heard through the headphones, to a comfortable level for the child. A simple but adequate set of headphones is supplied with the BrainFit. Note that headphones with a higher specification will require a lower volume setting. Choose a level the child can easily hear through the headphones being used – a click at the selected level will be heard if the Left and/or Right Buttons are pressed. The choice is a volume level from 01 up to 15. NB This setting will only be offered if auditory stimuli is selected.
  
- 5. Repetition setting** When repetition is 'on' the last stimulus is repeated if both left and right buttons are pressed simultaneously (within 20ms of each other). The number of repetitions used by the child will be displayed in the evaluation. Repetition can be set to be on or off.
  
- 6. Test time setting:** Allows for the length of the training session to be preset.  
Choose from:- endless OR 01mins up to 60mins. In 1min steps.
  
- 7. Confirm. setting:** The BrainFit has two ways of confirming each correct answer. Choice is:-

  - Confirm. Off Confirmation signals can be switched off in case they distract the child.
  - Confirm. Lights The red lights will flash with each correct answer by the child.
  - Confirm. "OK!" The "OK!" will be appear briefly on the display after each correct answer.

### Introduction

The Temporal Order Threshold is the smallest possible separation in the time between two stimuli necessary to decide which of the two stimuli (the one on the left or the one on the right) was first.

- For stimuli the BrainFit uses either auditory clicks via headphones, or visually, two red light flashes via red LEDs built into the front of the device.
- There is a facility to use only the clicks, only the light flashes, or combinations of the clicks and light flashes either together or randomly clicks or lights. (See p.2 Adjusting the Operation Settings)
- The child's response to the stimuli is by pressing either Left or Right answer button.
- Each press of an answer button will trigger the next stimulus pair.
- It is important to impress upon the child that considered, well planned responses are required – rather than immediate reactions to the stimuli. They will have one minute to decide on their response before the BrainFit switches off automatically so, there is time to 'think before pressing'.

### Temporal Order Threshold

If the Temporal Order threshold score is unknown, the Brain Fit can be used to get an initial indicator.

Details of the different BrainFit set up options are on p.3. How to select the options is on p.2.

A quick set up for checking the Temporal Order threshold would be as follows:- (See the chart on p.2)

- Switch the Brain Fit on by pressing the **Menu** button. Plug the headphones firmly into the socket. Ensure they are worn the correct way round – R on right ear and L on left ear.
- Press the '-' and '+' buttons simultaneously. Within each setting use the '-' or '+' button to choose the appropriate option. Then the **Menu** button to move down to the next setting.:-
- For the Calculation setting, choose approximate (rather than percentsteps).
- The Start Value setting will only offer 500ms (milliseconds) in the approximate option.
- For the Stimuli setting, choose auditory.
- For the Volume setting, choose a level the child can easily hear through the headphones – press the Left or Right button to hear a click at the selected level. Adjust accordingly.
- For Repetition setting, choose Repetition: On.
- For the Test time setting, choose 3min.
- For the Confirmation Setting, choose "OK!".
- Press the button beside start> to begin.

The BrainFit will start with 500ms between the two auditory clicks (one in each ear) and uses this time for 10 attempts. If there are at least 8 correct answers made within these 10 attempts, the BrainFit will reduce the time between the clicks by a half – so the time on the display will become to 250ms and that will be the time used for the next 10 attempts. If 8 correct answers are again achieved, the BrainFit will again reduce the time by a half, in this case to 125ms, and so on until the child is unable to make 8 correct answers. The display will always show the current time in ms the BrainFit is using in its calculation.

When less than 8 answers are correct, the BrainFit will increase the time between the clicks to midway between the failed time and the last successful time. For example, if successful at 250ms but not at 125ms, the Brain Fit will calculate and display a time of 187ms. It will then use this adjusted time for the next 10 attempts. In this way the Brain Fit will get close to the Temporal Order threshold of the child.

Once more experience has been gained in using the BrainFit, a more accurate assessment of the child's Temporal Order threshold will be found using the calculation option '**percent**'. This adjusts the time difference between the stimuli with every press of an answer button.

**Using the BrainFit as an Assessment Indicator**

- Firstly, read the Instructions thoroughly and play with the BrainFit to become comfortable working with it and practised at adjusting the operational settings.
- Used as part of an assessment, the BrainFit gives helpful indicators as to how children are visually and/or auditorily processing. **THIS IS NOT A DIAGNOSTIC DEVICE.**
- The BrainFit is particularly useful within a Pre and Post assessment framework around an intervention approach, for example:-
  - The Listening Programme, Johansen IAS or some other auditory training programme.
  - A reflex inhibition, Sensory Integration or other motor development approach.
  - The use of the BrainFit as a training tool (see below).
  - Some other or a combination of above.
- The BrainFit may also indicate referral for professional / medical examination or assessment by Behavioural Optometrist, Audiological Specialist or Speech and Language Therapist.
- Where a child's challenges are likely to be auditory, it can be useful to start them using the BrainFit in visual setting and 'approximate' calculation. This can give an initial level of success before changing to the auditory setting.
- In visual setting: The BF Admin. can position themselves in front of the child to more easily observe that they are pressing the correct answer button to match the light flashes. If consistently pressing the wrong button, the BF Admin. can hold the BrainFit and ask the child to point to the light that flashed first, and so on. If this seems to resolve the problem, a Sensory / Motor Integration approach is indicated.
- In auditory setting: If issues arise the BF Admin. can plug another set of headphones into the 2<sup>nd</sup> socket and observe and listen. By positioning in front of the child and wearing the headphone the 'wrong way round' the BF Admin. can save having to 'double process' to keep up.
- Record the score in ms that the child manage to settle out at. As the child will likely be unfamiliar with the device, it may be better to use their second or third attempt as a more accurate indicator of their threshold level.

**Using the BrainFit as a Training Tool**

1. Training can begin in the auditory setting and then in the visual setting using the approximate Calculation. When both auditory and visual scores are comparable, move on to the auditory/visual setting (au/vi+im). In this setting, the BrainFit will randomly activate either the auditory clicks or the light flashes. The child therefore has to maintain attention in both senses to be able to accurately respond. Continue training until the times again reduce.
2. If the child has a short attention span, the training time needs to be limited and the auditory sense can be trained through the visual one. By selecting the combined setting (aud+vis), the BrainFit will seemingly give the auditory and visual stimuli at the same time, but the auditory clicks will actually be some 40ms earlier than the visual lights. A good strategy with this setting is to train for 5 days a week and re-check on day 6 with the auditory setting to see if the same value can be achieved with the auditory stimuli only.
3. For subsequent training, select the Calculation setting of percentsteps. To motivate the child, the Start Value should be set above the Temporal Order threshold score to ensure the session begins with correct answers. If the Start Value is set too high, the training can be ended with the Menu button and the Start value adjusted before beginning again.

**Temporal Order Threshold: some background information**

The Temporal Order processing speed norm across all the sensory modalities of auditory, visual and tactile for identifying the correct sequence of events was found to be in the range 20 – 40ms (Hirsch & Sherrick 1961). This raised the question of whether processing speeds significantly outside of this range would have an effect on speech perception.

Several experiments were set up with brain injured patients who suffered from aphasia and normal control subjects using the Temporal Order (or Lateral Order Threshold as Steinbuchel called it) as the indicator of speed of brain processing. (v. Steinbuchel 1987). The results clearly showed the control group with an auditory Temporal Order value of 32ms whilst the patient groups had Temporal Order values in the range 107 – 125ms.

Even more interesting was that a target patient group responded to training using equipment similar to the BrainFit and improved their Temporal Order value to 37ms. They then showed a marked improvement in their ability to discriminate between voiced and unvoiced sounds.

In checking the auditory information necessary to discriminate between voiced and unvoiced consonants (like “d” vs. “t”) it was found that in control subjects the “d” was heard as such up to a brain processing speed of 25ms. At a processing speed above 50ms practically everybody heard the sound “t” ie there is a categorical shift in phoneme perception within this auditory processing window of about 25ms. So, if the BrainFit indicates a slowing down of brain functioning it is likely that speech perception would be affected.

**Evaluation of the results from the BrainFit**

**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 child's threshold level, assuming that the child has actually reached his/her limit.

The correct response percentage figures explained:

- If values of 95-100% are achieved, this indicates that the child has not yet reached his/her actual threshold. Many failed attempts must be made during a test in order to measure a child'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 child has correctly identified the stimuli, but has pressed the buttons the wrong way round. In such cases, the process should be repeated once the child has been reminded what to do (check that the headphones are on the correct ear – i.e. ‘right’ on right ear?).
- Values that vary greatly from one side to the other, e.g. 60% / 90% (or vice versa), indicate that the child has an inclination to respond more on one side. This may indicate a hearing deficiency, e.g. significant differences between the child's two aural canals.

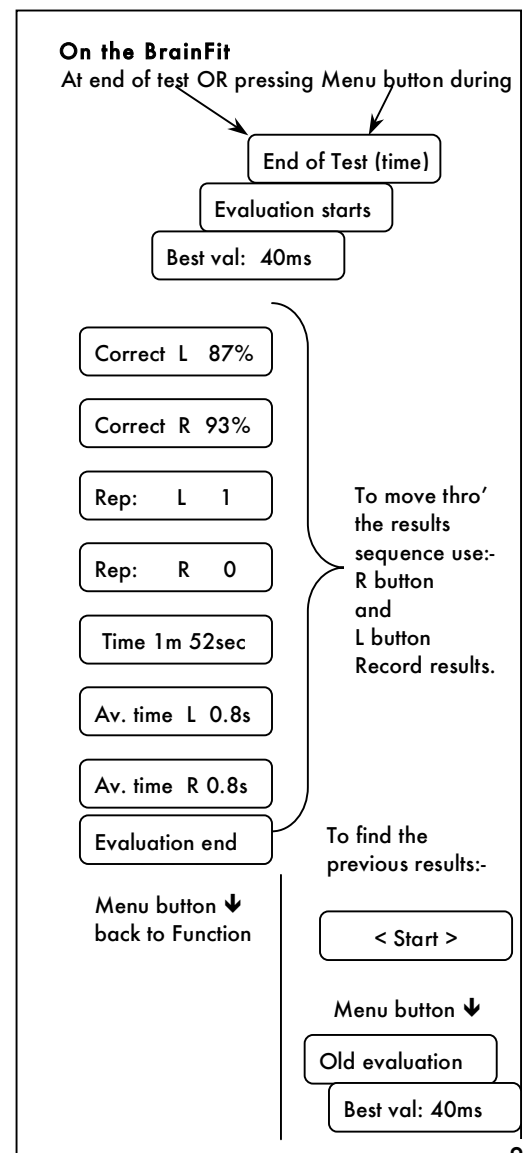
**Repetition [RPT...]:**

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

**Time:**

The time is given in minutes and seconds [.... : ....] for the whole activity.

The 'Av. time' is the average response time taken to press an answer button following the stimuli.



As a rough guide, experience has shown that for children aged eight upwards, a score of up to 50ms indicates no issues, whereas a score in excess of 100ms may indicate some problems and further investigation required. It is only a rough guide but very quick and visible for both the BF Admin. and the parent / Teacher if they are present.

However, a researched age appropriate table developed in Germany is reproduced below.

An Age Appropriate Response Table for Temporal Order Threshold :-

Age (Years)	Auditory (ms)			Visual (ms)		
	Mean	Unusual	Significant	Mean	Unusual	Significant
5	160					
6	155	>300	>450			
7	145	>220	>300	370		
8	140	>170		150	>300	>300
9	100	>150	>200	150	>200	>170
10	85	>120	>160	120	>120	
11	75			75		

Source : Audiva based on work by Dr.H. Rosenkotter, SPZ Ludwigsburg (inkl. der Daten Sommer-Stumpfenhorst, 1996; Tremmel 1996 and Rosenkotter 1997)

**Motivation:**

When the Calculation setting **approximate** has been selected, the BrainFit software defines each "8 out of 10" attempts as a "level". Therefore, successful achievement of 8 out of 10 correct answers will reduce the time between stimuli by half - and move to a new "level". With each attainment of a new level the Brain Fit is pre-programmed to give audible and visual encouragement to the child. The BrainFit will play a double tone, flash its red lights and show a message on its display:-

Level 1: under 500ms	Keep going
Level 2: under 250ms	Good
Level 3: under 125ms	Very good
Level 4: under 62ms	Cool
Level 5: under 31ms	Fantastic
Level 6: under 15ms	Genius
Level 7: under 7ms	Superman
Level 8: under 3ms	Magician

- Then the display will show 'attention' followed by the next stimulus pair.

# Audiva BrainFit : ASSESSMENT RECORD CHART

Name:-

Function	Calculation setting	Start value setting	Stimuli setting	Volume setting	Repetit'n setting	Test time setting	Confirm setting	Best val	Correct Left	Correct Right	Repetition Left	Repeat Right	Total Time	Av. Time Left	Av. Time Right
Date of Assessment:-								Evaluation Data recorded by the BrainFit:-							
Temporal Order	percent	50 - 950 ms	Record of Set-Up used (circle, ✓, or highlight) auditory, L 1-7 On visual, R 1-7 Off au/vi-im, Only "OK" au+vi	L 1-7 On R 1-7 Off	On Off	Unlimited 1-60 min	Light OFF Light ON Only "OK"	ms	%	%	No. of times	No. of times	Minutes Seconds	Seconds	Seconds
Menu button →	approx.	Only 500 ms													
Date of Assessment:-								Evaluation Data recorded by the BrainFit:-							
Temporal Order	percent	50 - 950 ms	Record of Set-Up used (circle, ✓, or highlight) auditory, L 1-7 On visual, R 1-7 Off au/vi-im, Only "OK" au+vi	L 1-7 On R 1-7 Off	On Off	Unlimited 1-60 min	Light OFF Light ON Only "OK"	ms	%	%	No. of times	No. of times	Minutes Seconds	Seconds	Seconds
Menu button →	approx.	Only 500 ms													
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Menu button →	approx.	Only 500 ms													
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Menu button →	approx.	Only 500 ms													
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Menu button →	approx.	Only 500 ms													

### **Safety and maintenance instructions:**

- Make sure you adhere to these safety instructions.
- Use and store the device out of the reach of young children. It contains small parts that could be swallowed by them.
- Also keep the packaging materials (plastic bags, foils and strings) and batteries out of the reach of young children.
- Patients suffering epilepsy should only use the Brain Fit with the approval of their GP.
- During training concentration is needed. Do not use when there are other distractions.
- The Brain Fit should not be used in a wet environment (e.g. rain) or in temperatures below 0 degrees C or above 45 degrees C.
- Use the Brain Fit only in its original state (do not open it to look inside).
- To clean, wipe with a clean dry or damp cloth. Stubborn dirt can be carefully removed with cleaning fluids but do not use cellulose thinners or abrasive cleaning products.
- Prevent any fluids from seeping into the device. Should any fluid get into the Brain Fit, take out the batteries and consult your Distributor.

### **Batteries:**

- The BrainFit should arrive with 3 X LR1 type batteries already fitted.
- If the display fades or has low contrast, or the device fails to switch on, the batteries may need replacing. To do this follow these instructions – or contact your Distributor.
  - Carefully open the case by prising the two halves apart using a knife or fine pointed, flat screwdriver at the midline joint on the side of the case. First one side then the other side until the top half of the case can be separated from the bottom half.
  - Carefully remove and replace the batteries ensuring +ve and -ve terminals are the correct way round.
  - Carefully align the two halves of the case, ensuring that the buttons will pass easily through the holes in the front, gently but firmly snap the two halves of the case together.
  - Switch on using the Menu Button. Check that the display shows 'Battery OK' and that all the buttons depress easily.
  - If in doubt – contact your Distributor.

### **Guarantee:**

The BrainFit is guaranteed for 12 months from date of purchase when used in accordance with these instructions. In the unlikely event that any problems are experienced please contact your Distributor in the first instance.