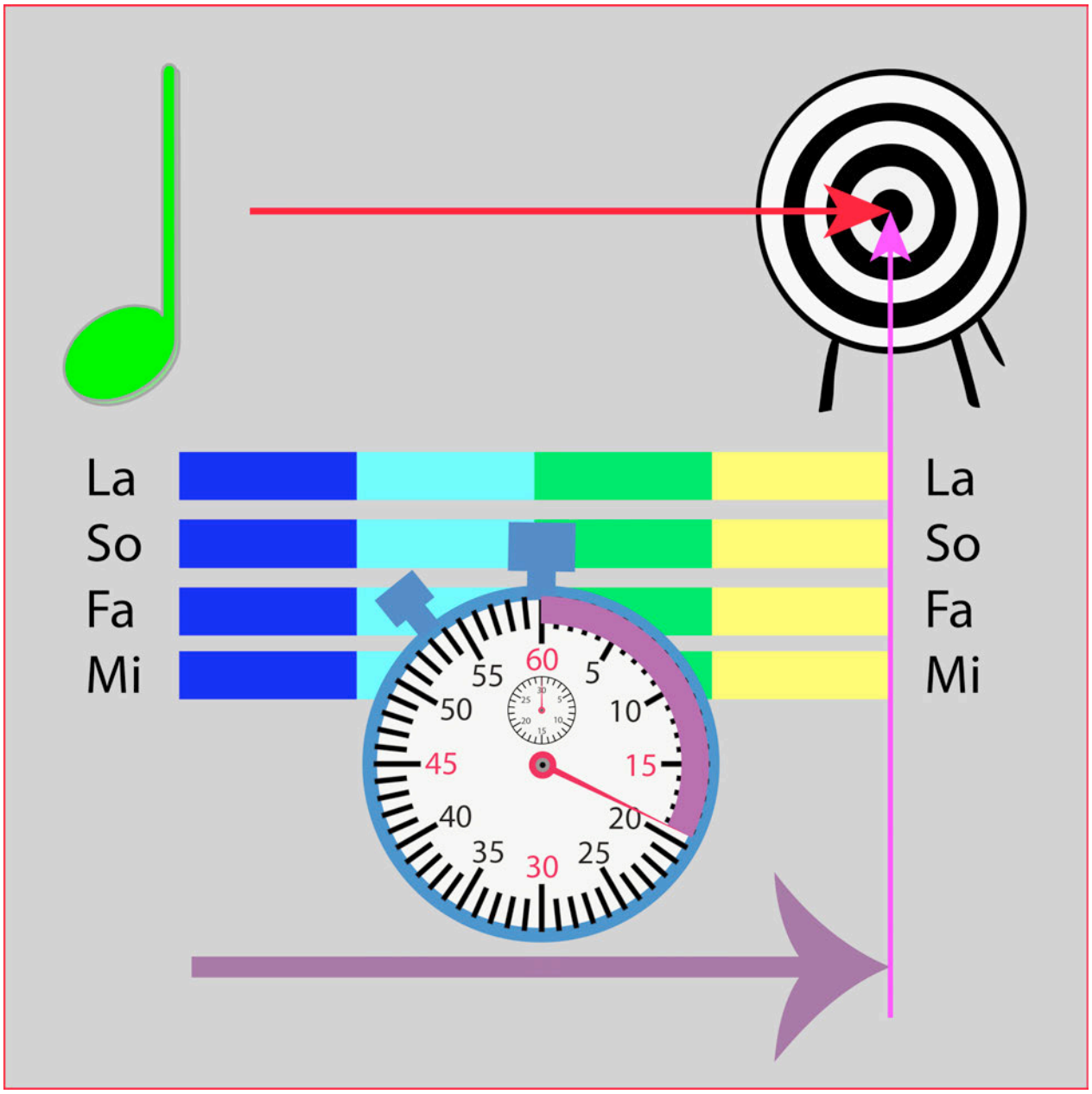

Pitch Ability Test

User's Manual (v1.01 – December 2016)

www.AlgorithmsAndDataStructures.com, F. Rudin

Pitch Ability Test (PAT)

User's Manual

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Table of Contents

User's Manual i
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Trademarks i
Table of Contents 1
Welcome to the Pitch Ability Test (PAT) 3
What is unique to the Pitch Ability Test? 4
Contact 4
Installation Macintosh 5
Installation Windows 9
First Time Use 19
Select User 22
Pitch Ability Test Overview 23
Pitch Ability Test Introduction 24
Starting the test for the first time 24
Selecting a Silence Period and Starting the Test 26
The Pitch Ability Test 28
The order of events during the test 28
Felix's Pitch Point 40
Why is the Pitch Ability Test a trailblazer for absolute pitch? 41
Why is the Pitch Ability Test an assessment of basic music skills? 43
Statistics 45
The concept of the Pitch Ability Test 46
Tips for using the test 48
Microphone settings 48
Environment 48
Recognize trends 48
Variety and confidence 48
Finding a music teacher 48
Practice times 48
FAQ 49
Where do I get support? 49
Can I print the statistics? 49
Why the elaborate licensing terms? Is the use of software all at my sole risk? 50
Do I have to be online to use the software? 50
No sound for low notes 50
Microphone Input level too low, distortion or audio device not supported (Macintosh) 50
Microphone Input level too low, distortion or audio device not supported (Windows) 51
Registration 54
License Agreement 55
License 55
Permitted uses 55
Restrictions 55
CD Delivery 55
Copyright 56

1. OpenAL on Macintosh 56
2. OpenAL on Windows 57
4. OggVorbis 60
5. Third party Libraries 61
Music and Sounds 61
Images 61
Warranty disclaimer 61
Limitation of liability 62
Return Policy 62
Privacy Policy 62
Controlling law and severability 63

Welcome to the Pitch Ability Test (PAT)

Can you produce the same pitch with your voice, whenever you want? Yes – then you have probably Absolute Pitch too. Absolute Pitch or Perfect Pitch includes – according to Wikipedia – the ability to "Accurately sing a named pitch".

Unfortunately, Absolute or Perfect Pitch has a very broad definition and includes numerous musical abilities. To my knowledge there is no official definition of what the requirements for Absolute Pitch are. For example Wikipedia states:

Generally, absolute pitch implies some or all of the following abilities, achieved without a reference tone

- Identify by name individual pitches (e.g. A, G, C♯) played on various instruments.
- Name the key of a given piece of tonal music.
- Reproduce a piece of tonal music in the correct key days after hearing it.[*citation needed*]
- Identify and name all the tones of a given chord or other tonal mass.
- Accurately sing a named pitch.
- Name the pitches of common everyday sounds such as car horns and alarms.

The word "generally" in the beginning implies the difficulty to find an exact scientific definition for the term. The use of the word perfect as a synonym implies a 100% success rate in tests. But in a real world, errors occur: nobody is perfect. Unfortunately, no test description exists that defines the criteria to identify Absolute Pitch possessors. For example: To be an Absolute Pitch Possessor requires 95 correct pitch guesses out of 100 in the range of C2 to C6, the pitch presentation is done by sinus waves for 1 second, and the answer must be given within 1 second.

The lack of such a test makes the term Absolute or Perfect Pitch more to a myth than to a useful term.

So I have decided to make a more scientific approach and concentrate – in my opinion – on only the most important aspect of Wikipedia's definition of Perfect Pitch: The accurate production of a named pitch without a reference tone.

I call the ability to correctly reproduce a given pitch after a specified time: the pitch ability. To measure your absolute pitch ability, I introduce the Pitch Ability Test. The test introduces a reproducible and measurable situation for the pitch ability. Therefore the test is a scientific approach.

The scientific setup to measure your Pitch Ability is simple: You can freely choose four notes that you can sing comfortably. You set yourself the time you want to verify. Each note gets tested as follows: The note gets played two seconds. Then the silence time starts. However, you are allowed to immediately sing the note back for 2 seconds. After that no more sounds are allowed. Five seconds before your chosen silence time is due, you are again allowed to break the silence. In this way, you may bring your voice in shape by beginning to sing during that preparation phase. When the test time arrives, you must sing the note back for one second. This test is repeated for all 4 chosen notes. If you sing back all four notes within a precision of 25 cents, then you have proved your pitch ability for the chosen time.

Since the time is unlimited, the test has a reference point defined, Felix's Pitch Point, at a four-minute silence time. Times beyond this point are not of interest to determine your pitch ability. However, you still can measure them.

To measure your pitch ability requires that you have taken the test before and are familiar with the procedure. The pitch ability test measures your pitch ability in seconds. It does this similar to high jump sports: You have to choose a starting level. Instead of cm you chose a starting time that you think you can master. As long as you pass the test, you can set a higher level.

In the following section the Pitch Ability Test is described with a software program. However, the concept of the test is independent of a computer. The test could be done with a stopwatch and a person with a good ear. The tester doesn't need to possess absolute pitch; the tester is allowed to control the produced pitch with any correct pitched sound. Of course this is not as exact as measuring the difference by a computer, but, it is not really relevant, if you pass the test with 30 cents deviation or exact 25 cents deviation; less deviation is always better. Nor is it important that the mean is taken over exact 1 second. If the test is seriously executed, then you get a reliable result for the pitch ability. The important things to observe are: 1. That the silent-period is silent. 2. That a visual signal (or white noise) is used, when the test-time arrives. In essence: there should be no pitched reference sound during the silence period.

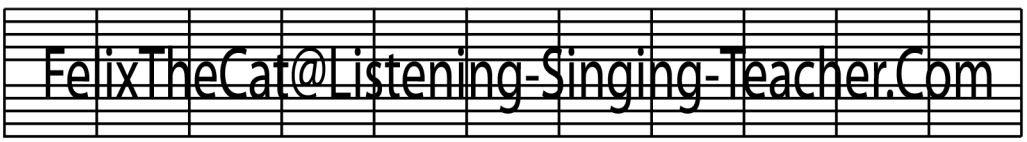
What is unique to the Pitch Ability Test?

It is the first test that measures the time of your ability to memorize a pitch. With the test you get a scientific method to measure your absolute pitch ability. The Pitch Ability Test defines the pitch ability as the silence period between hearing a pitch and its correct re-production by singing or humming it. Correct reproduction means your reproduced pitch, - taken as the mean of the reproduced pitch over 1 second -, is not allowed to deviate more than 25 cents of the original pitch.

Since the time is unlimited, an upper reference point, Felix's Pitch Point, at the ability of 4 minutes was introduced as the upper maximum for the test. In this way the test with 4 notes should take less than 20 minutes.

To have a test and thus feedback for your pitch ability enables you to train and therefore improve the ability.

Contact

We hope that the test is useful for you and helps you to improve your pitch ability. Your comments and inputs are most welcome. Please mail them to:

Installation Macintosh

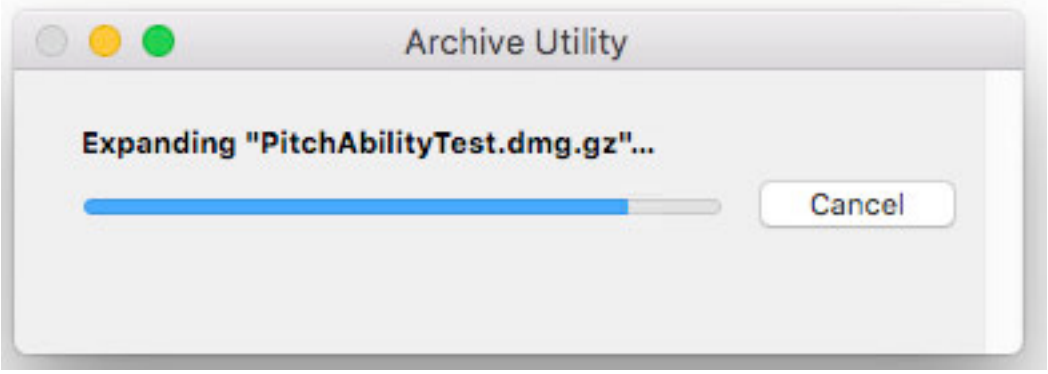
Requirements
Before you begin, make sure your computer has enough RAM to power the program quickly enough. OS X 10.7 or higher.

You must have an appropriate microphone connected to your computer. Check the relevant manuals on how to connect a microphone. If your Mac, does not have a microphone input; you have to use additional hardware, such as a computer-compatible USB device capable of handling microphone inputs. Important: A “line in” is not the same as a microphone input. If you do not have a microphone input you might need a pre-amplifier.

Getting and unpacking the disk image
First, download the compressed disk-image-file. In your browser go to www.Pitch-Ability-Test.com and download the newest version.

Warning: The file has about 120 MB and takes about 1/4 hour on a low-speed DSL line. After the download has completed you should see an icon on your desktop that looks like this:

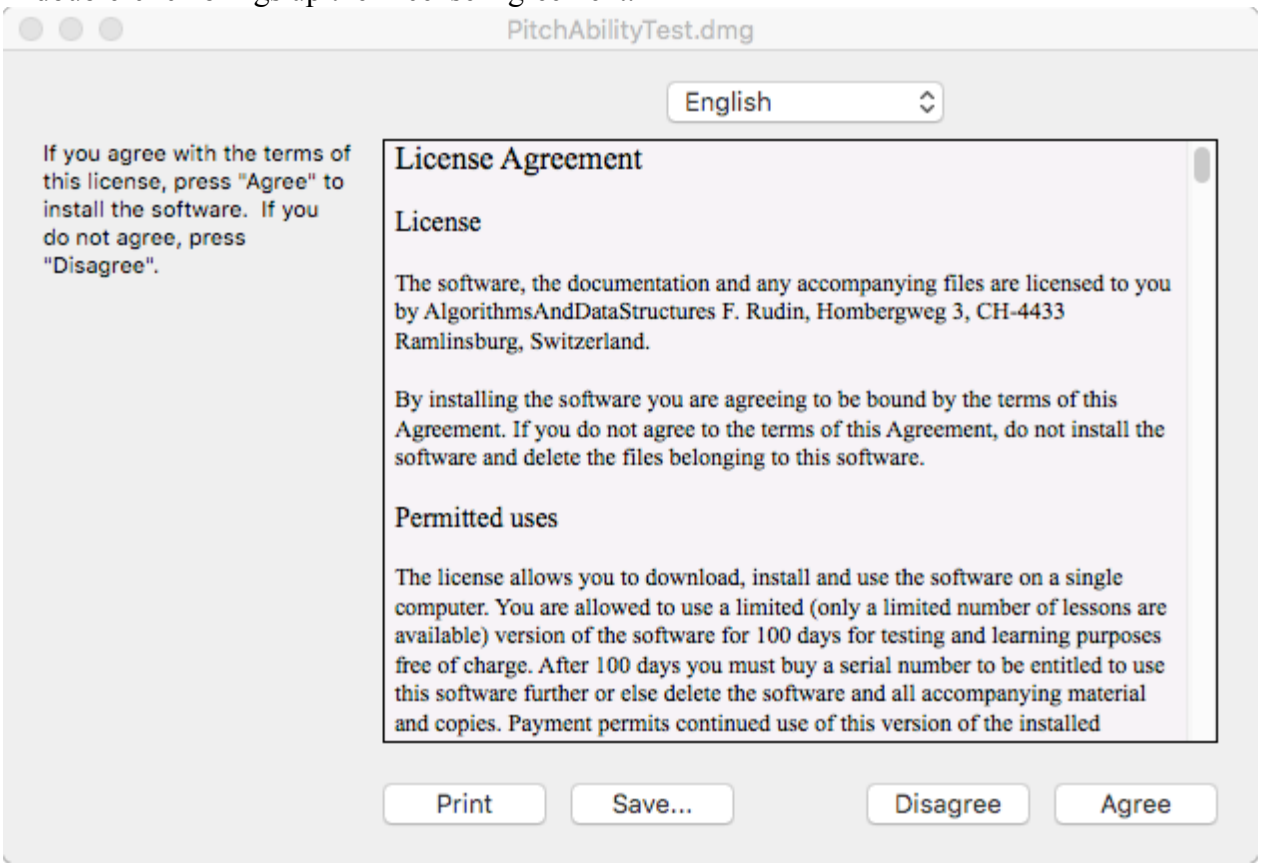
Second, decompress the file. Double-click on it; the Archive Utility appears.



After this task is completed, double-click on the new icon that was created.

The Disk Image gets mounted. On the desktop you should see the following icon:

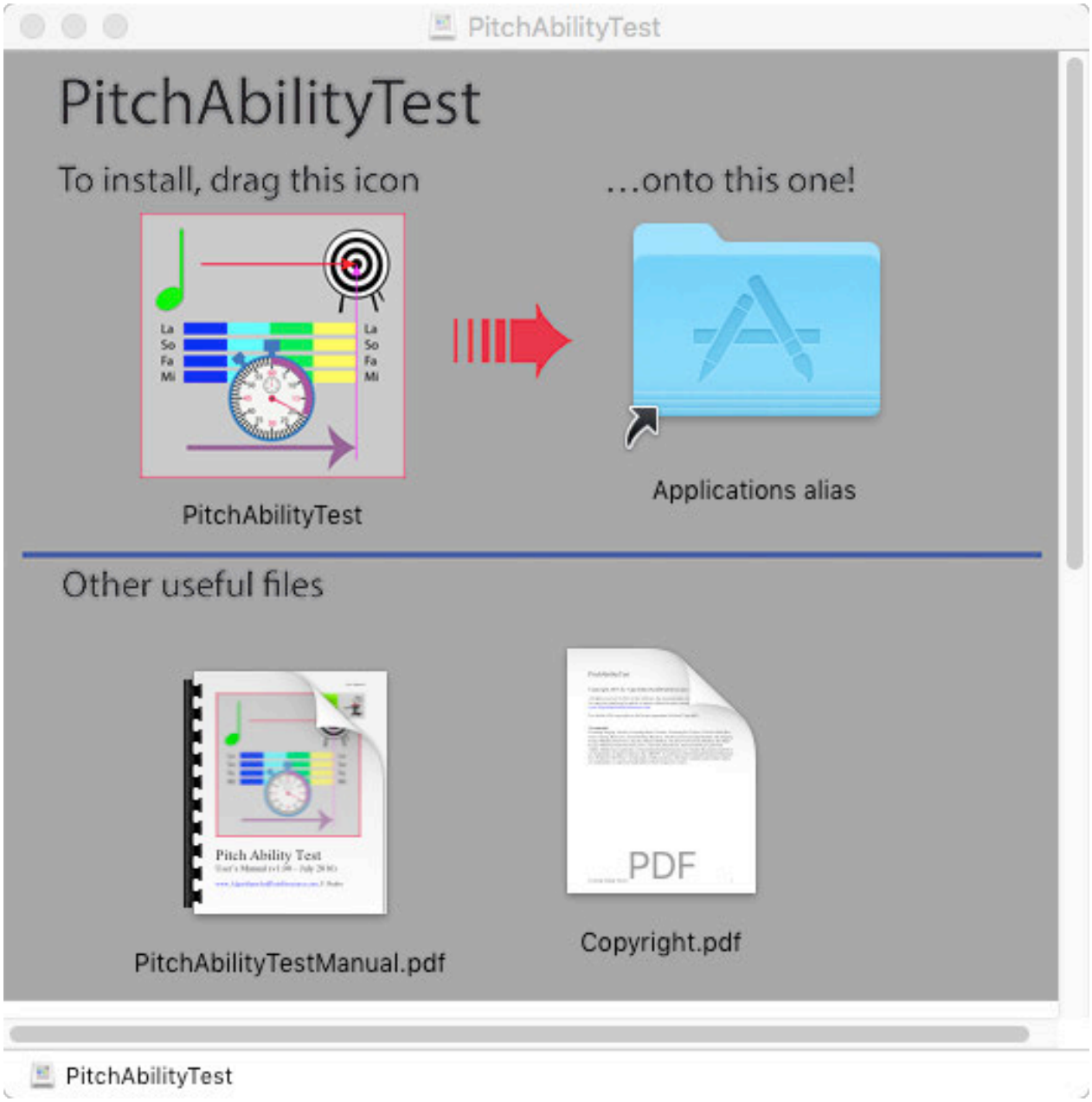
A double-click brings up the License Agreement.



Installation

Read the License Agreement. You must agree to the terms or discard the downloaded files.

If you agree, the installer window opens. Drag the PitchAbilityTest icon to the Application alias folder.



If you followed the instructions, PitchAbilityTest is installed in your Applications Folder.

Uninstalling PitchAbilityTest
In the Finder drag the Icon for PitchAbilityTest in the Applications folder to the Trash. Also move <UserHome>/Library/Preferences/AlgorithmsAndDataStructures/PitchAbilityTest to the Trash.

Installation Windows

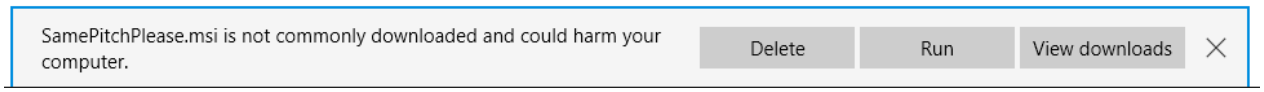
Requirements
Before you begin, you may want to make sure your computer has enough RAM to power the program. To have a good performance an Intel core Duo with 1 GB of RAM and an adequate graphic card is required. The program has been tested on Windows XP, Vista, and Windows 7/8/10.

You must have an appropriate microphone connected to your computer. Check the relevant manuals on how to connect a microphone to your computer. Some PCs have no microphone input, in which case you must use additional hardware, such as a computer-compatible USB device capable of handling microphone inputs. Important: the “line in” is not the same as a microphone input. If you do not have a microphone input you will need a pre-amplifier.

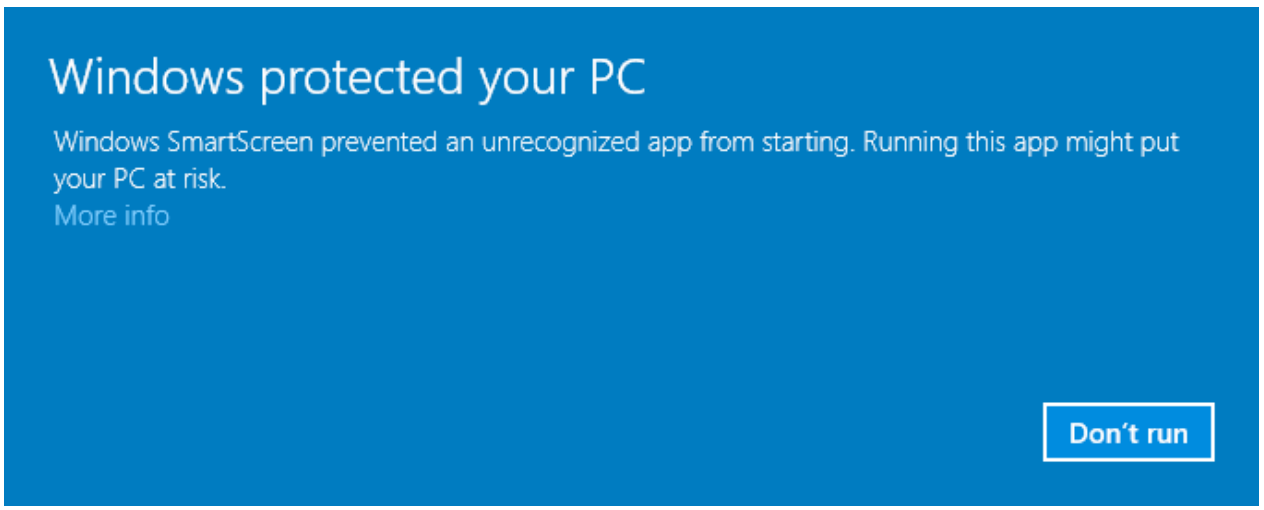
Getting the installation file
The first step is to download the compressed installation file (.msi). In your browser go to www.SamePitchPlease.com and download the actual version under the download-tab.

Warning: The file has about 120 MB; this will take about 1/4 hour on a low-speed DSL line:

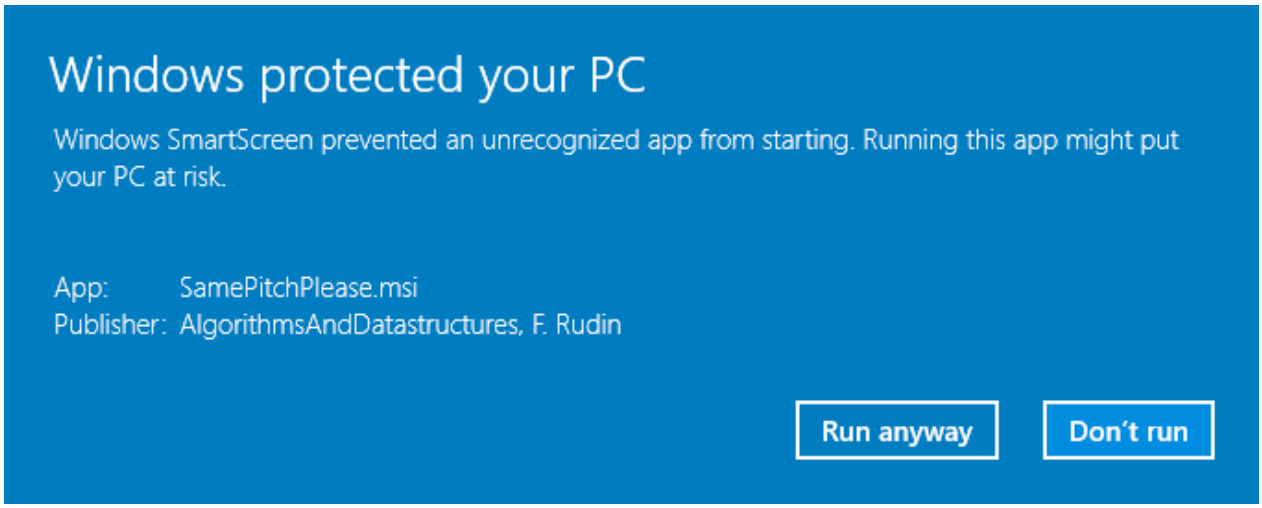
When the download finishes the following message appears:



Click “Run”.

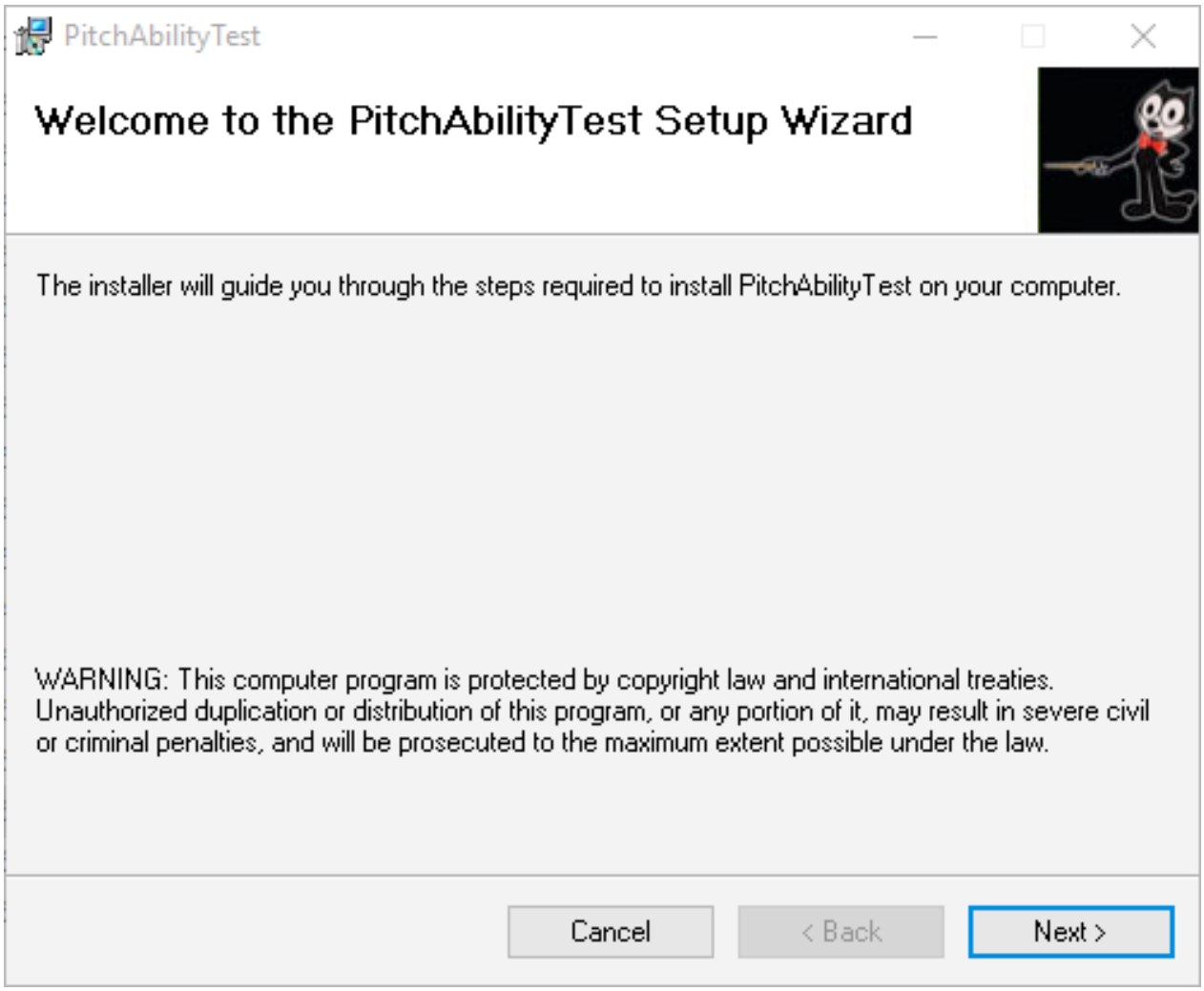


Click on “More Info”.

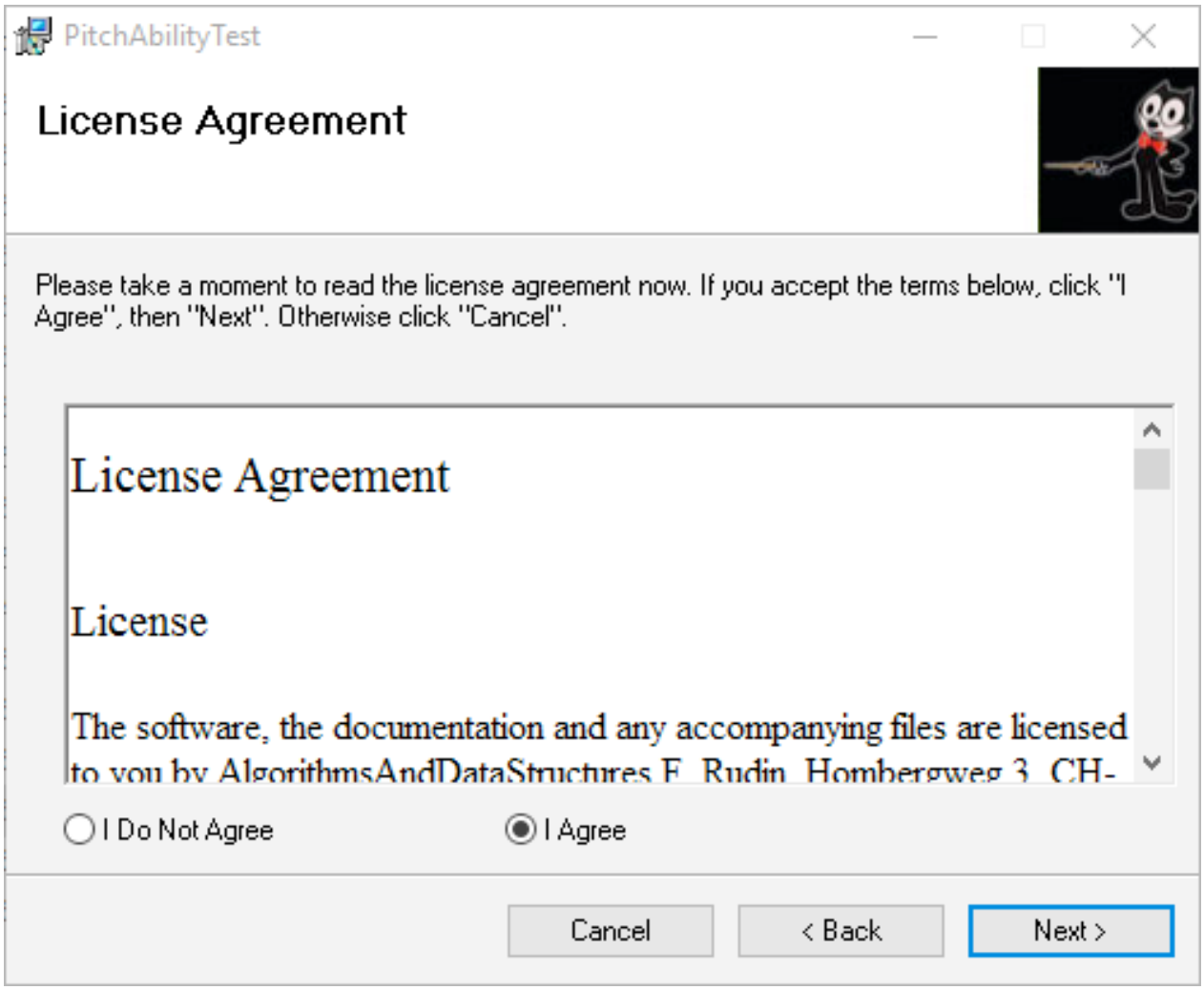


If you trust us: Click on “Run Anyway”.

The Setup Wizard Window opens:

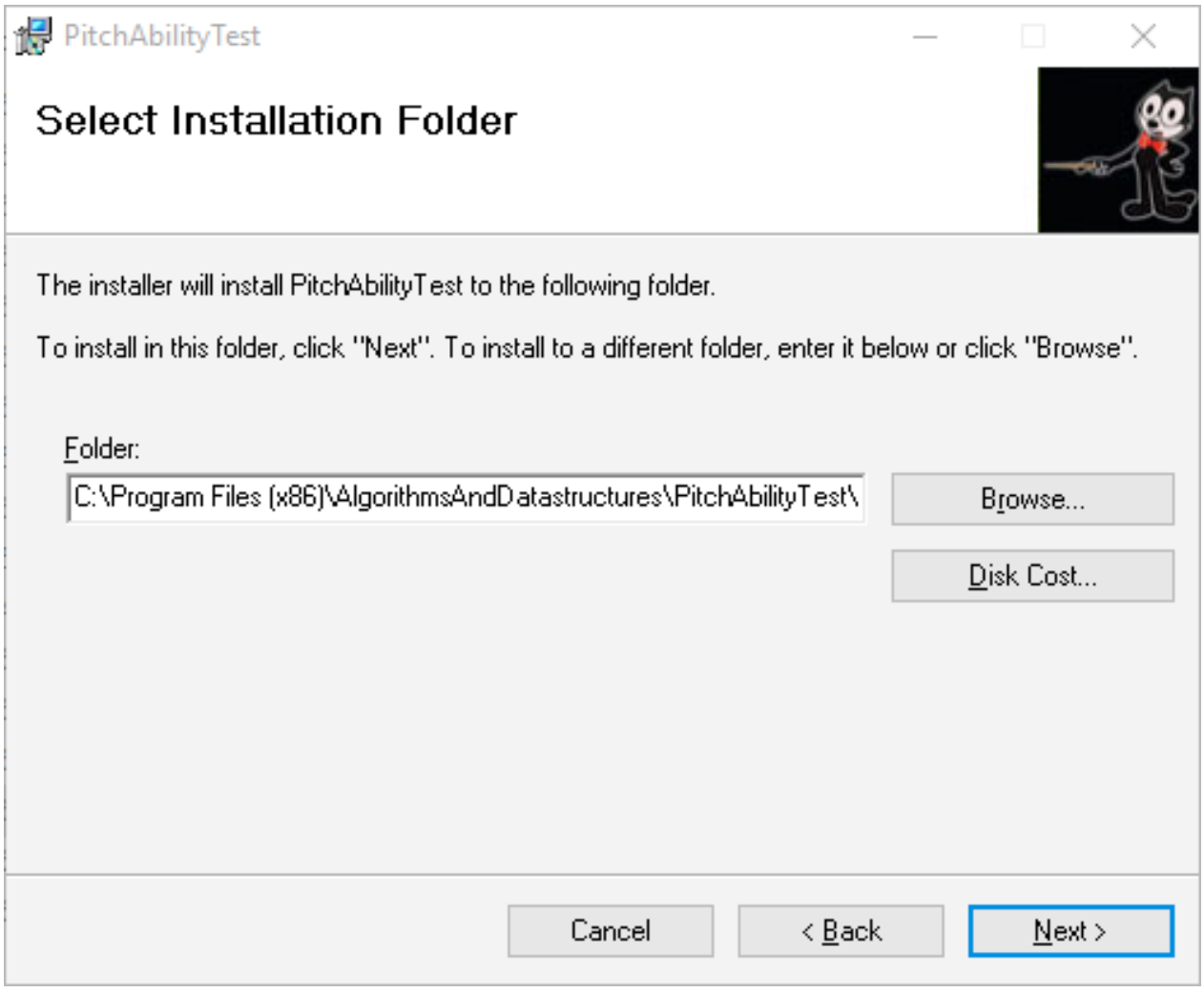


Click Next. The License Agreement appears.



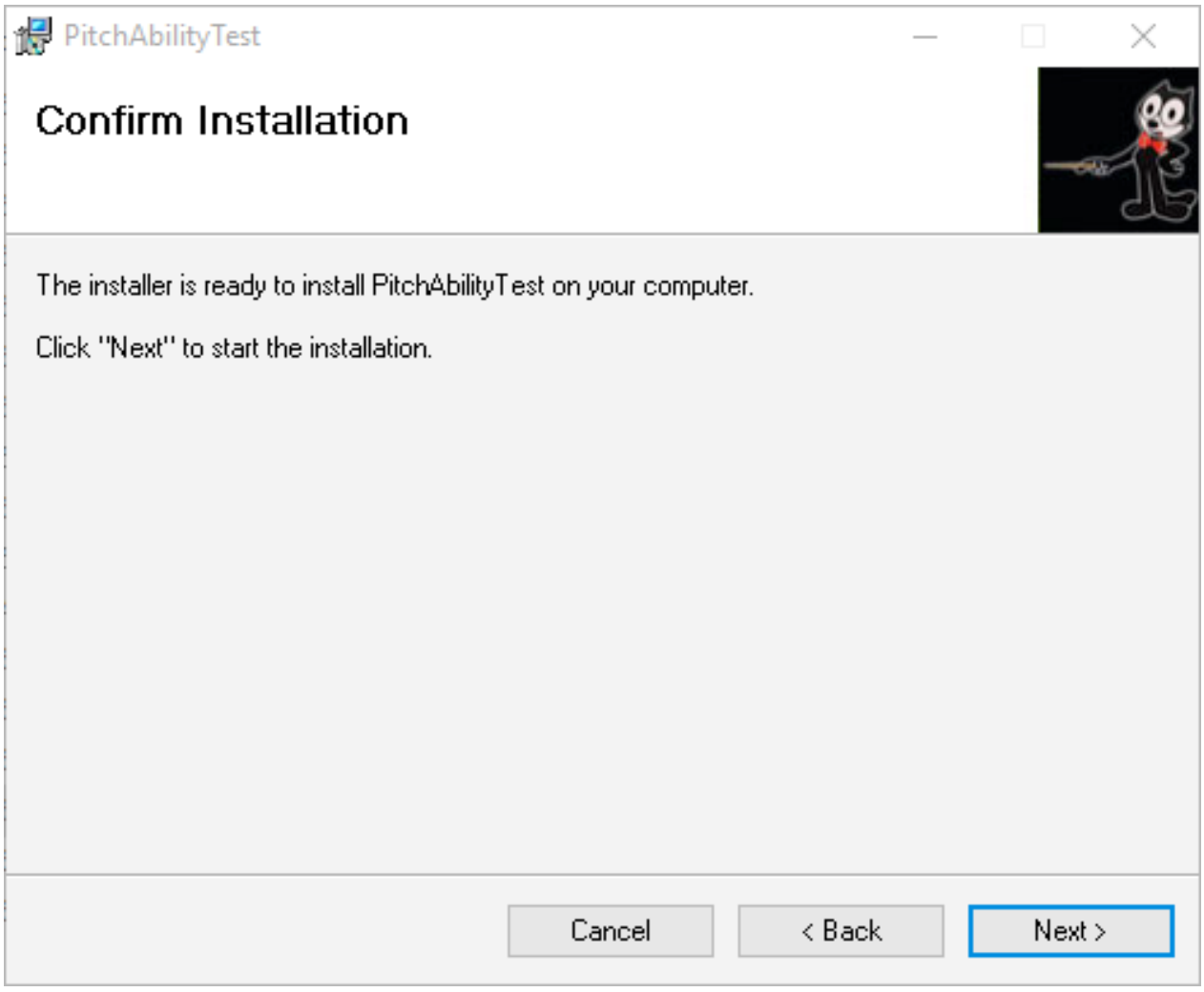
Read the License Agreement and the Copyright before installing. Click “I agree” if you agree with our License Agreement.

The “Select Installation Folder” dialog appears. By default the application will be installed under C:\Program Files\AlgorithmsAndDatastructures\PitchAbilityTest.

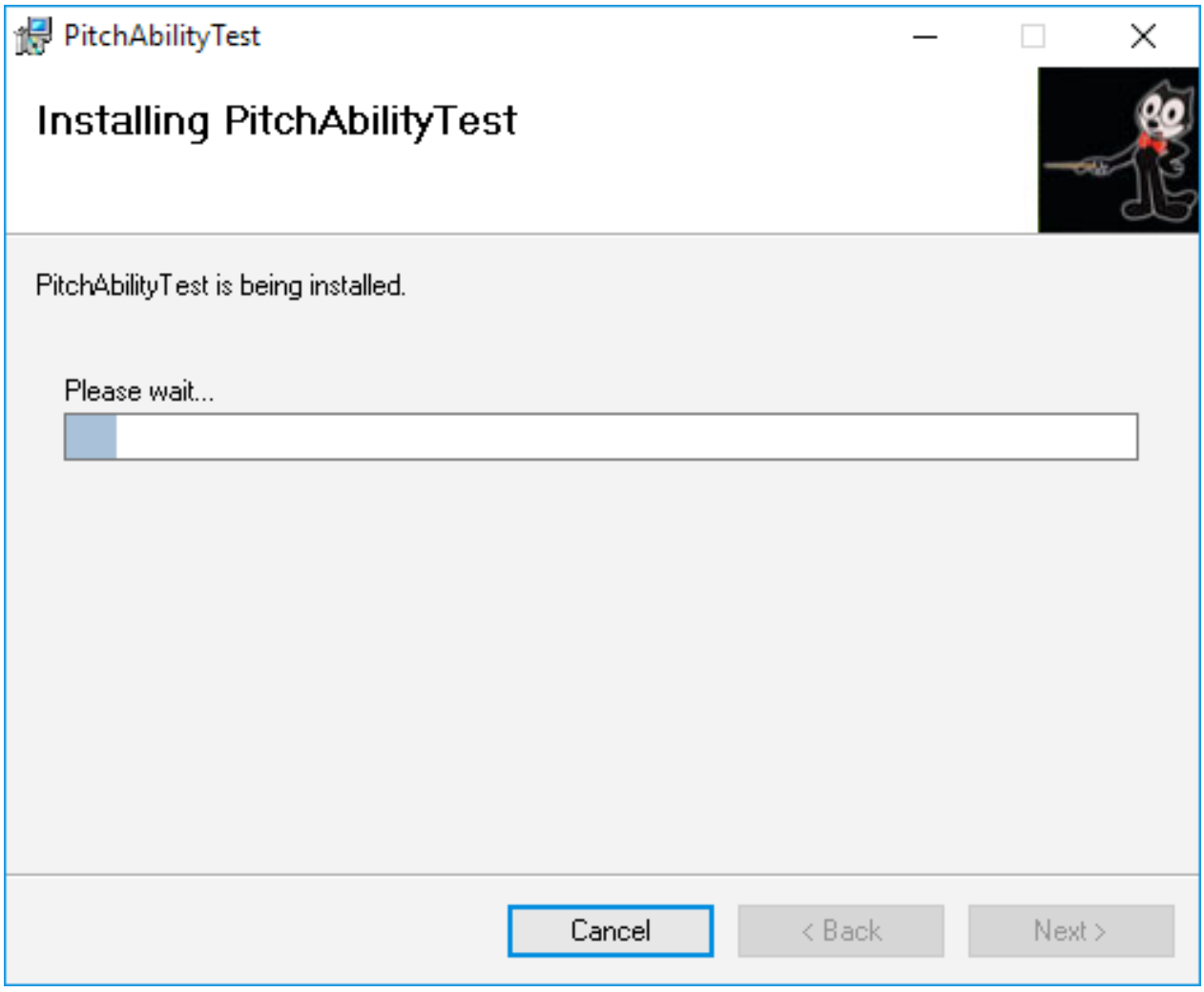


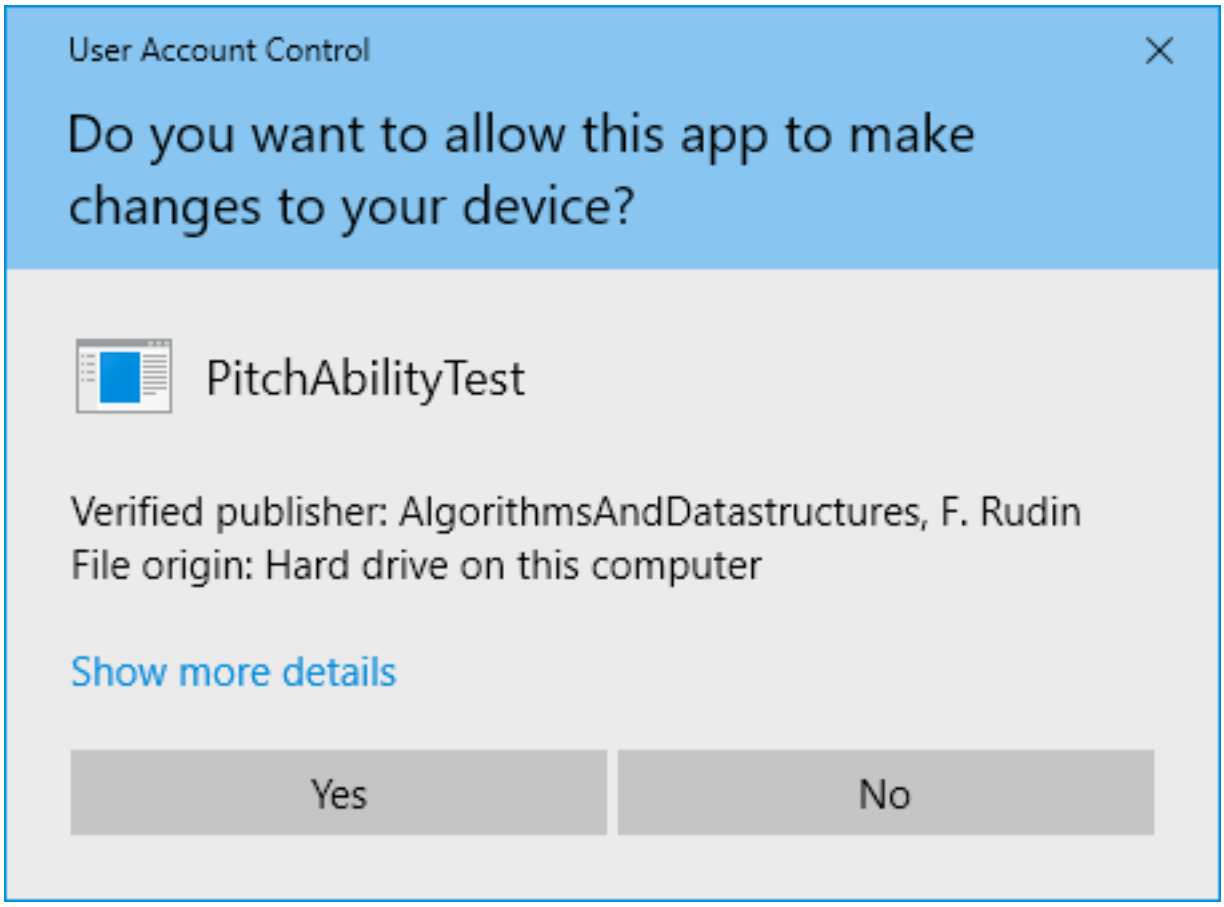
Choose your folder location and click “Everyone,” so that persons with a separate login on your computer can also run the program.

The confirmation Window appears:

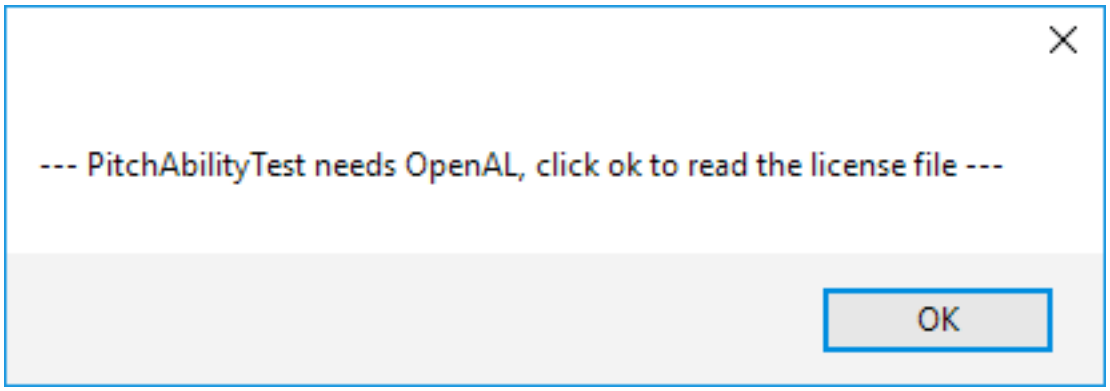


Click “Next” to start the Installation:

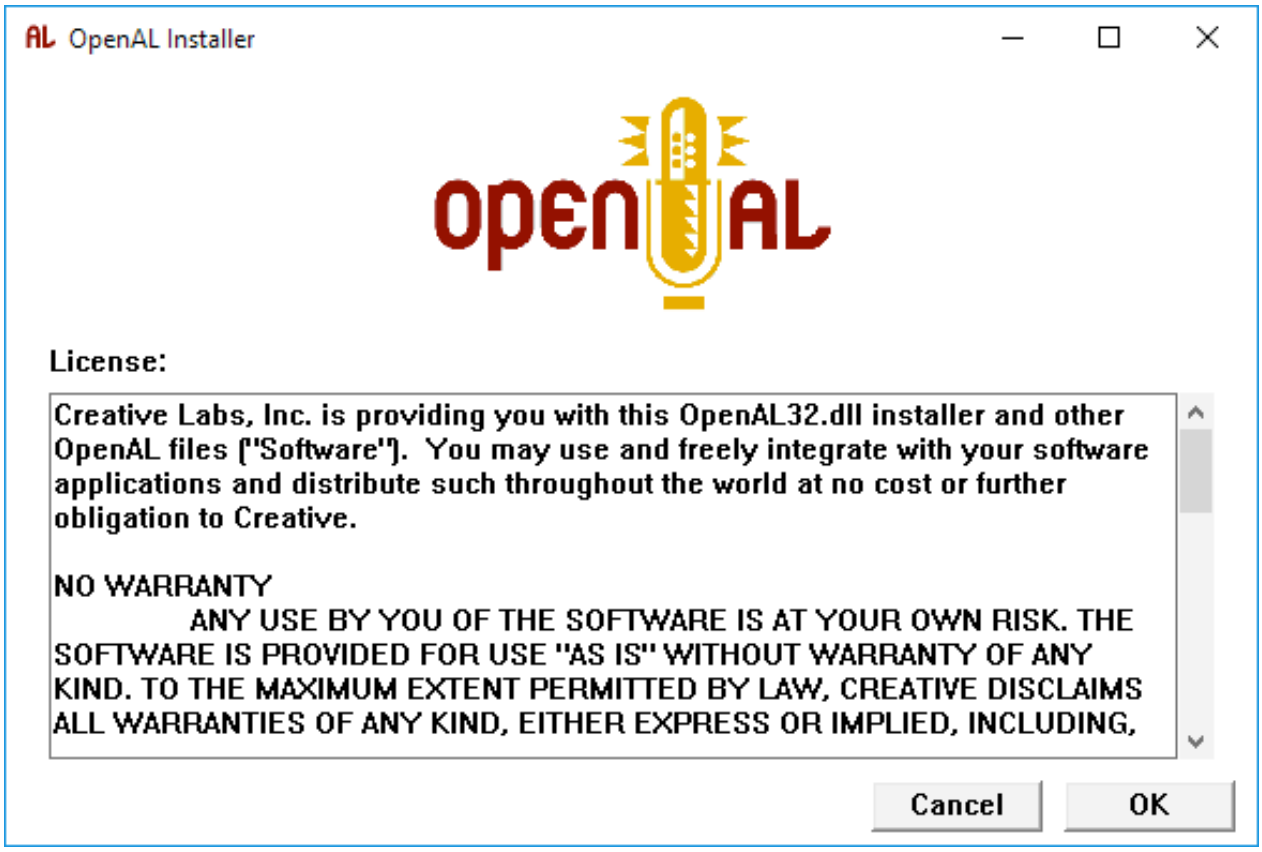

PitchAbilityTest
Installing PitchAbilityTest
PitchAbilityTest is being installed.
Please wait...
Cancel
< Back
Next >



PitchAbilityTest uses OpenAL for sound.

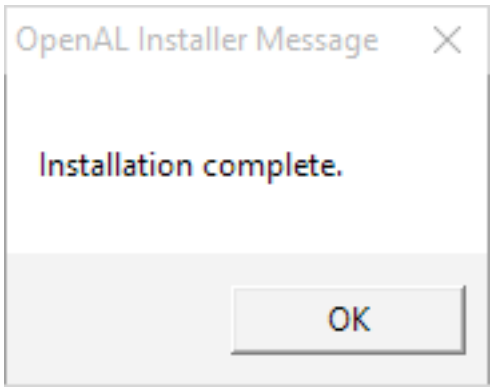


Click “Ok” and you will be presented with the OpenAL License Agreement:

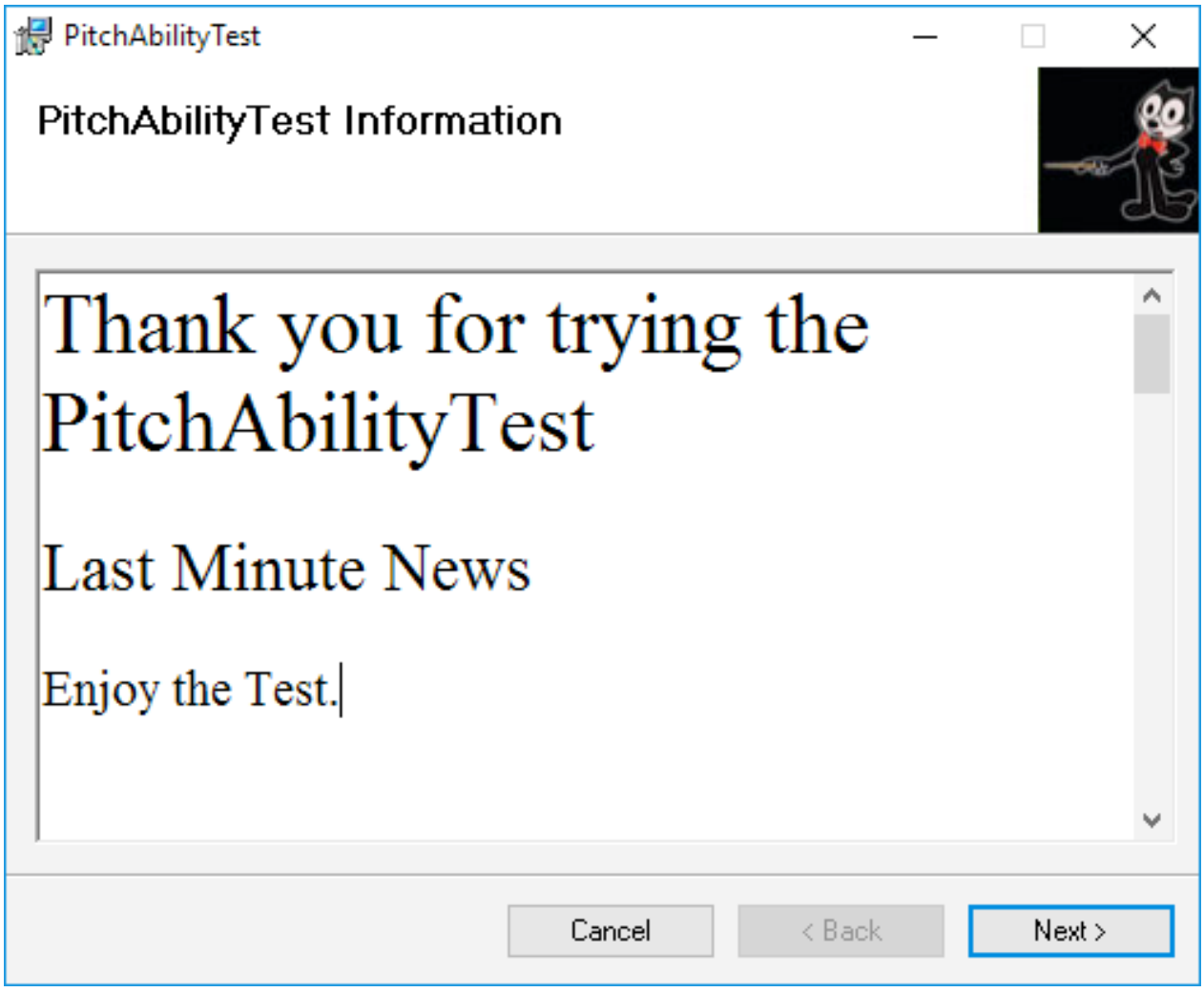


Click “OK” if you not already have installed OpenAL.

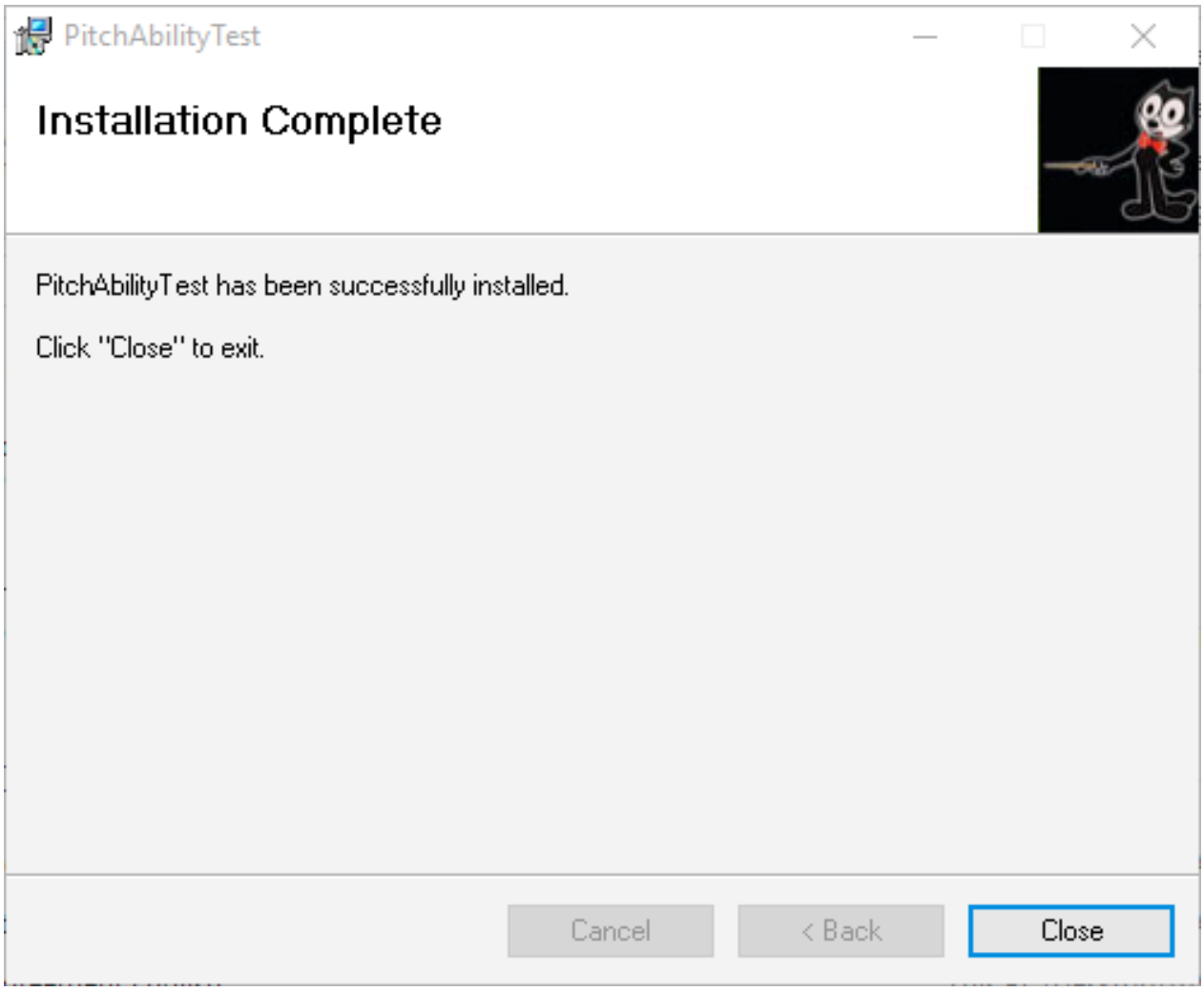
The OpenAL Installer informs you about the installation:



The installation is finished.

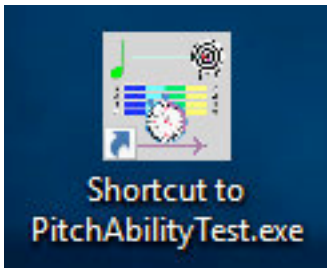


Browse through the ReadMe file, and then click “Next.”



Click “Close.”

On the Desktop you should find a Shortcut to PitchAbilityTest:

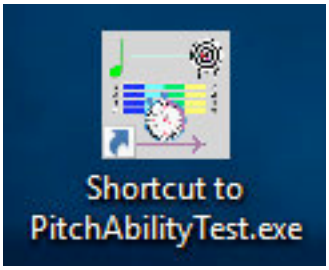


Uninstalling PitchAbilityTest
If you need to do so, use Uninstall from the Add/Remove Software Control Panel.

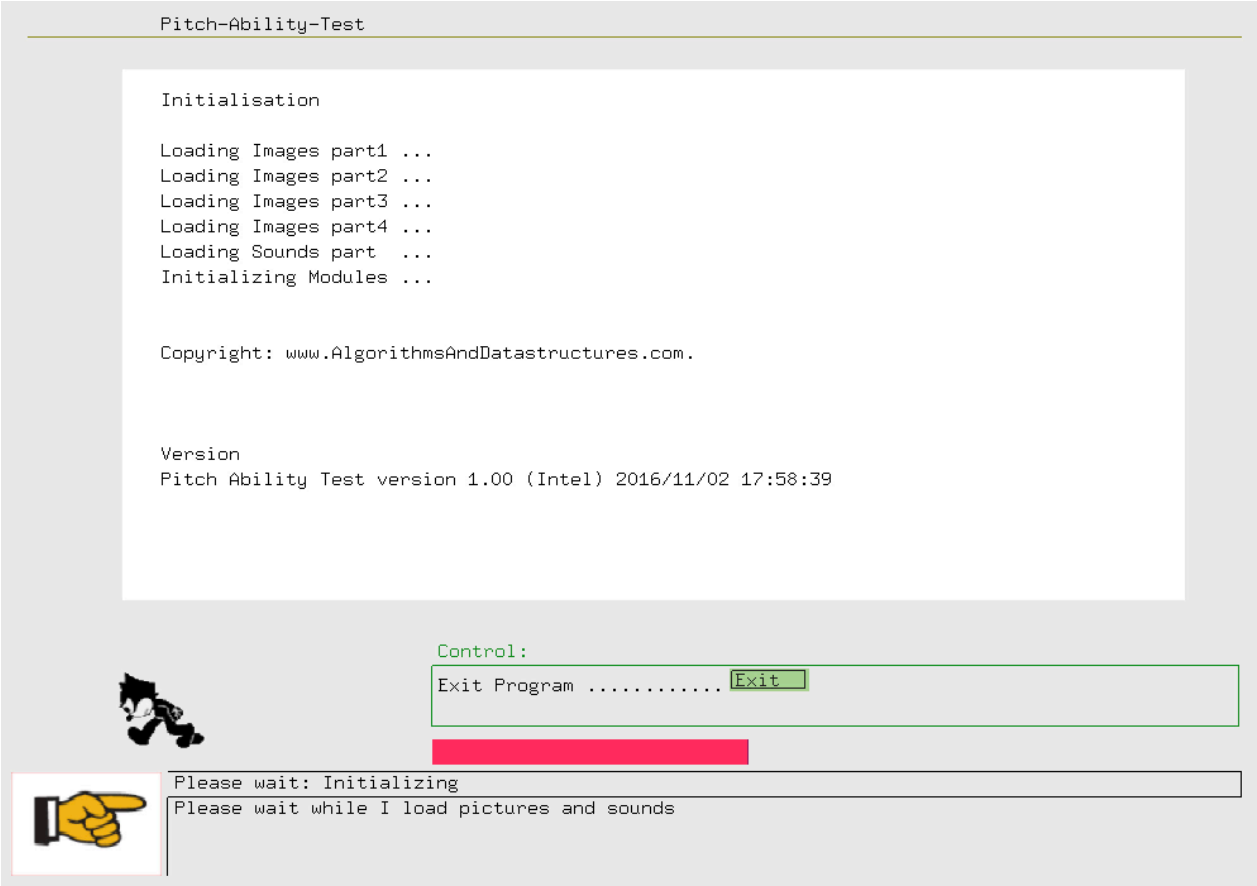
First Time Use

Macintosh: Double-click the application PitchAbilityTest in the Applications folder:

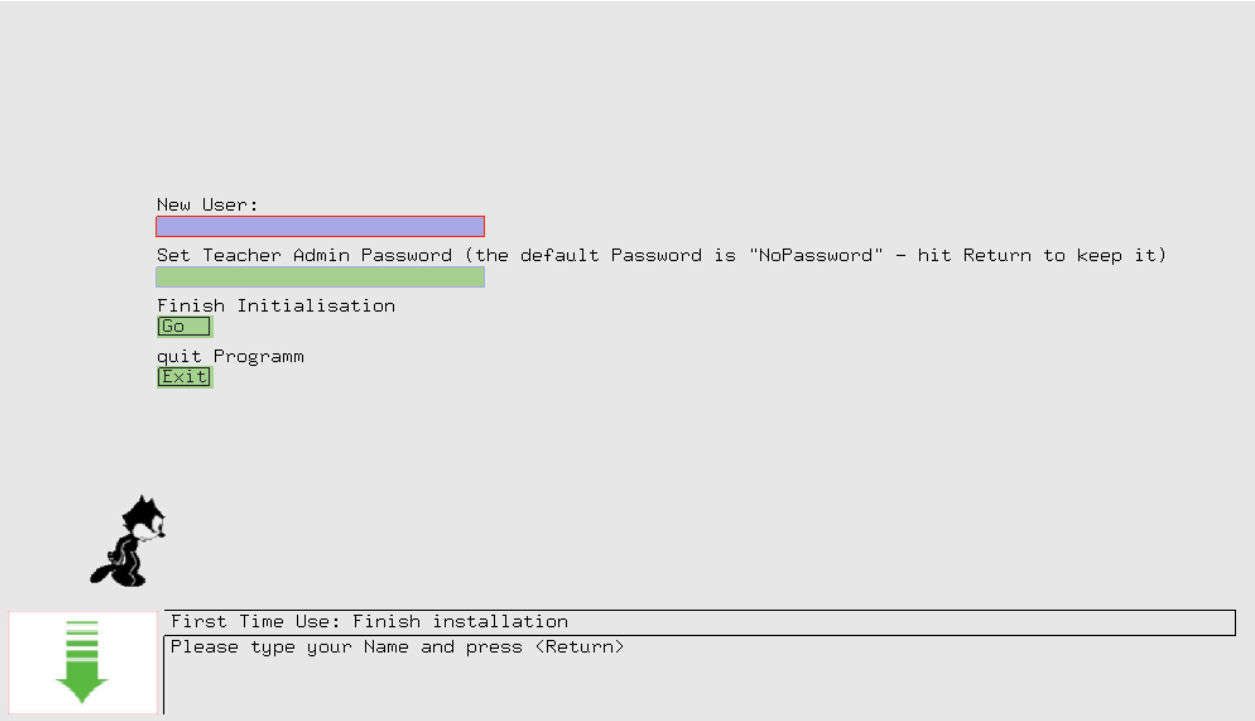
Windows: Double-click the shortcut on your Desktop:



The application starts initializing by loading images and sounds.



The first time you start the application the following dialog box appears:



First you must enter a User Name. The name may consist of a First and Last Name, separated by a blank space or a comma. Only American Standard Characters are allowed.

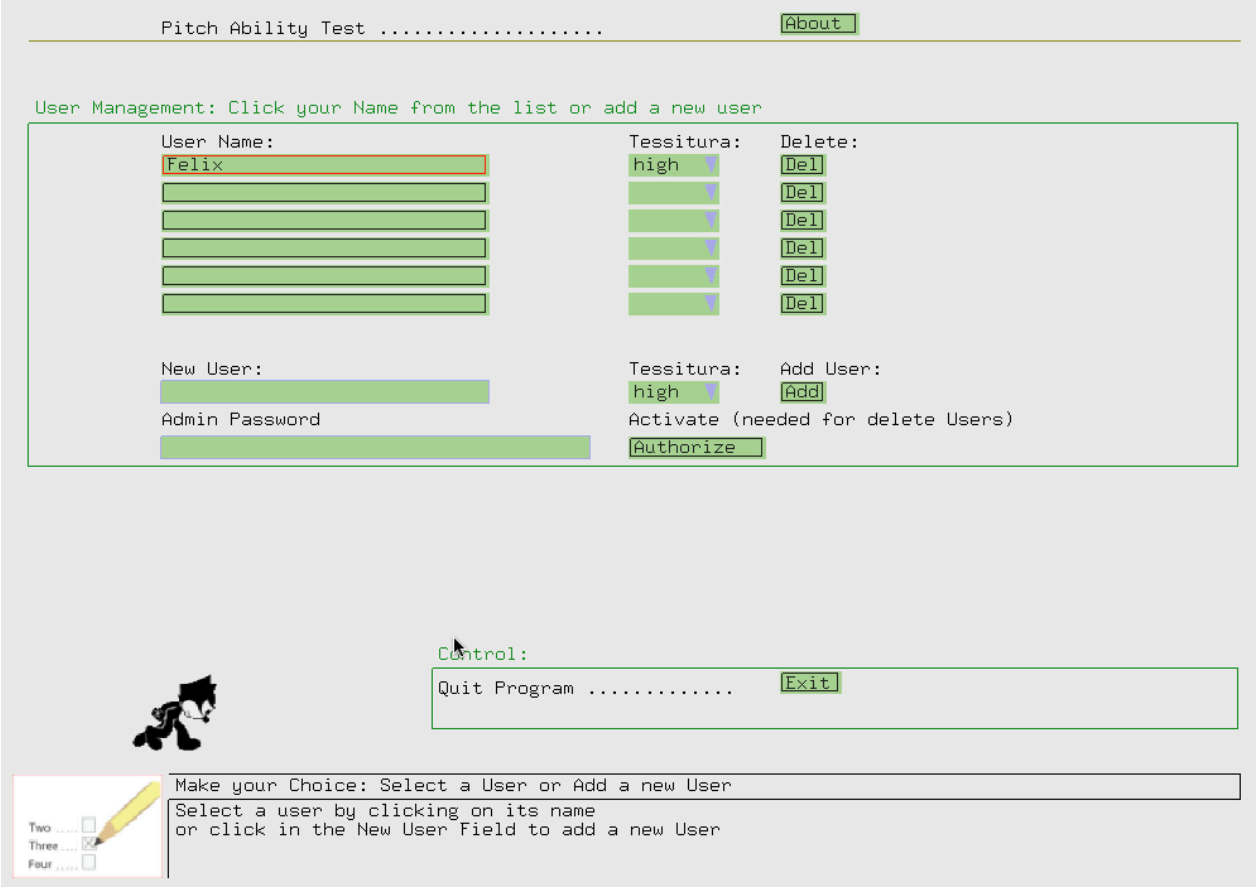
If you want a password, other than the default Admin Password “NoPassword,” change it. Please be aware that the password is case sensitive and must have at least 5 characters. If you forget or lose your password you must reinstall the application in order to delete users in the “Select User”s dialog (see below).

When you are done, click “Go” to continue.

Clicking “Exit” will leave the program in its current state, so it will ask you again for the name as when you first opened it.

Select User

In order to collect statistics for a particular user, the program must know which user it is working with. Therefore please select the user from the list displayed.



If you are not on the list, add your name by clicking in the New User field and typing it in. Select a tessitura (see next paragraph) and click “Add.” Your name should now appear and you can select it.

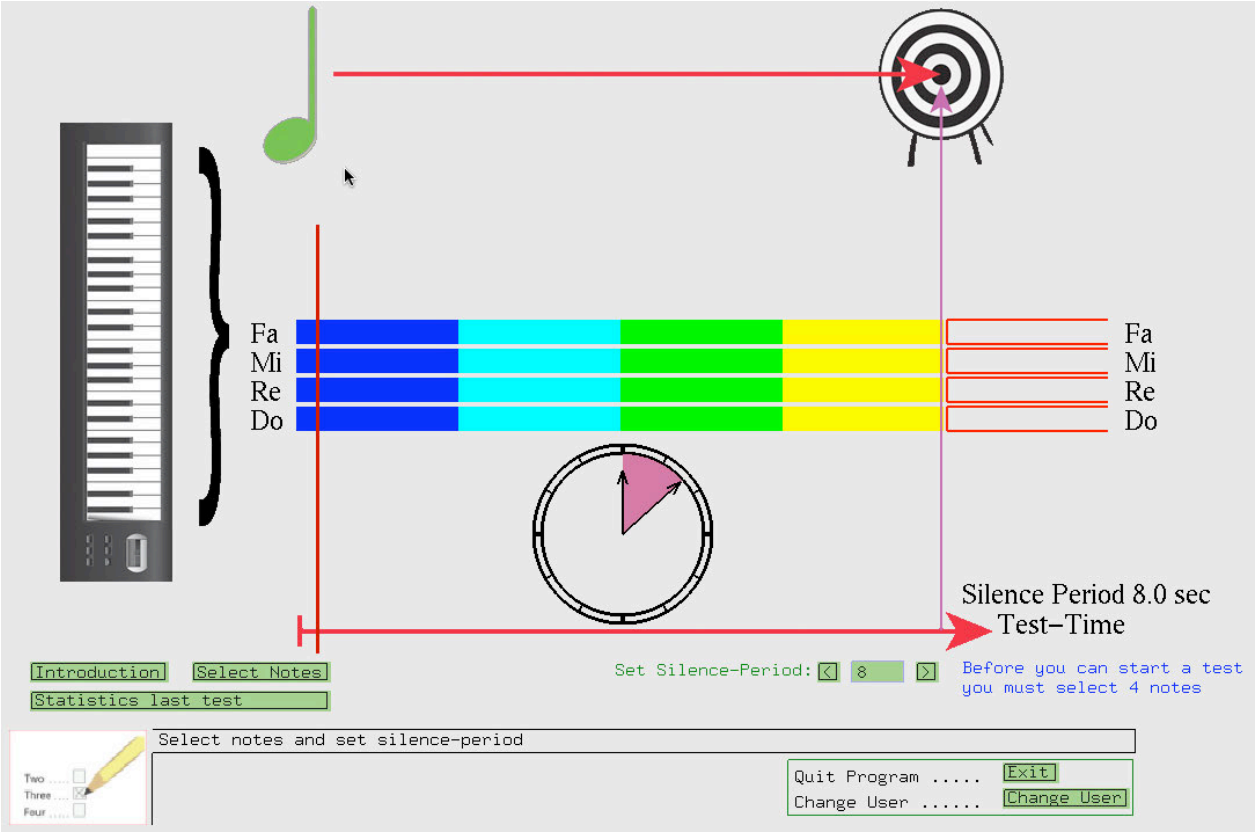
To adjust the exercises to the user’s vocal range, the user must select one, called a tessitura here. “High” designates soprano, “medium” baritone, and “low” bass. You can change the tessitura anytime by going back to this dialog box. The tessitura has no effect on the pitch recognition exercises chosen; it only displays the notes in a range suitable for your voice. If your voice spans a wide range (3 octaves or more), you may go through the exercises in all tessitura modes.

If you want to delete a user, you must enter the Admin Password and click “Authorize.” Then click the “Del” Button next to the particular user you want to delete.

The program PitchAbilityTest does not require any registration. Therefore, you can ignore the registration process explained in the last chapter.
For now, simply select your desired tessitura and then click on your name.

Pitch Ability Test Overview

After selecting your name, the Pitch Ability Test overview screen is presented:



Here you select your pitch ability level that you want to test.
If you haven't taken the test before, we recommend that you watch the introductory video.

Therefore click "Introduction".

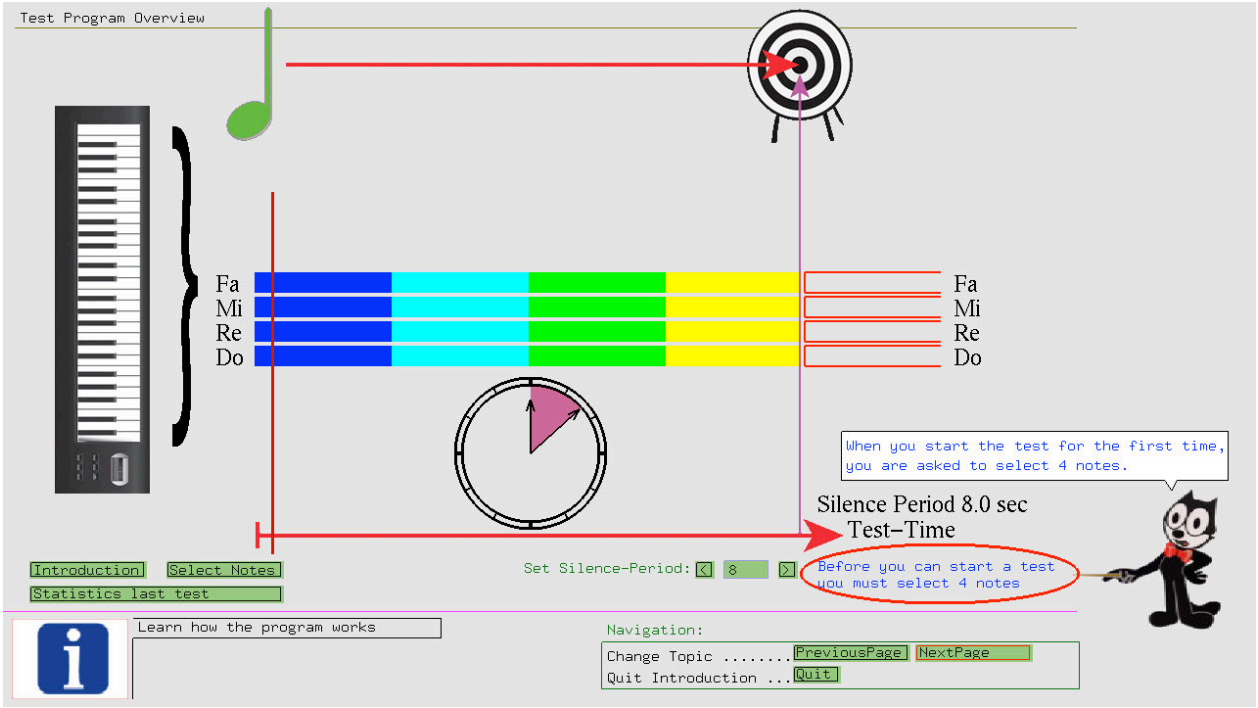
The following chapter summarizes the main points of the introductory video.

Pitch Ability Test Introduction

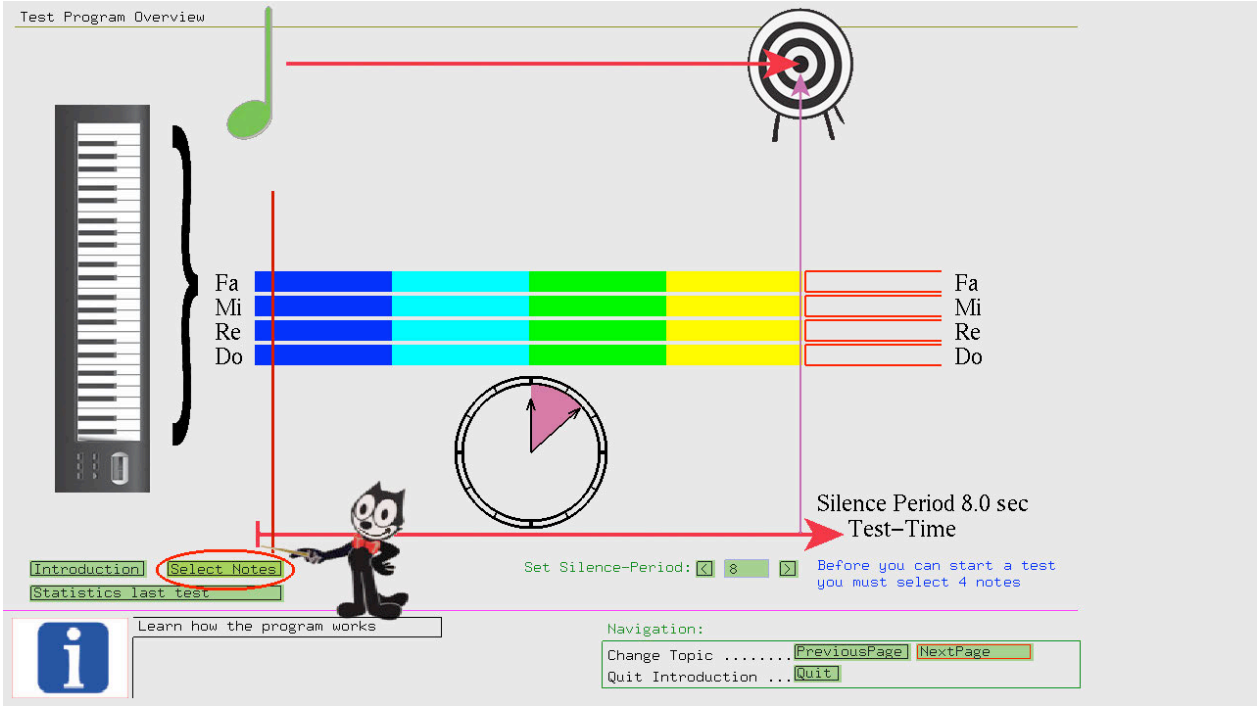
The introductory video introduces the concept behind the Pitch Ability Test and explains how the test works.

Starting the test for the first time

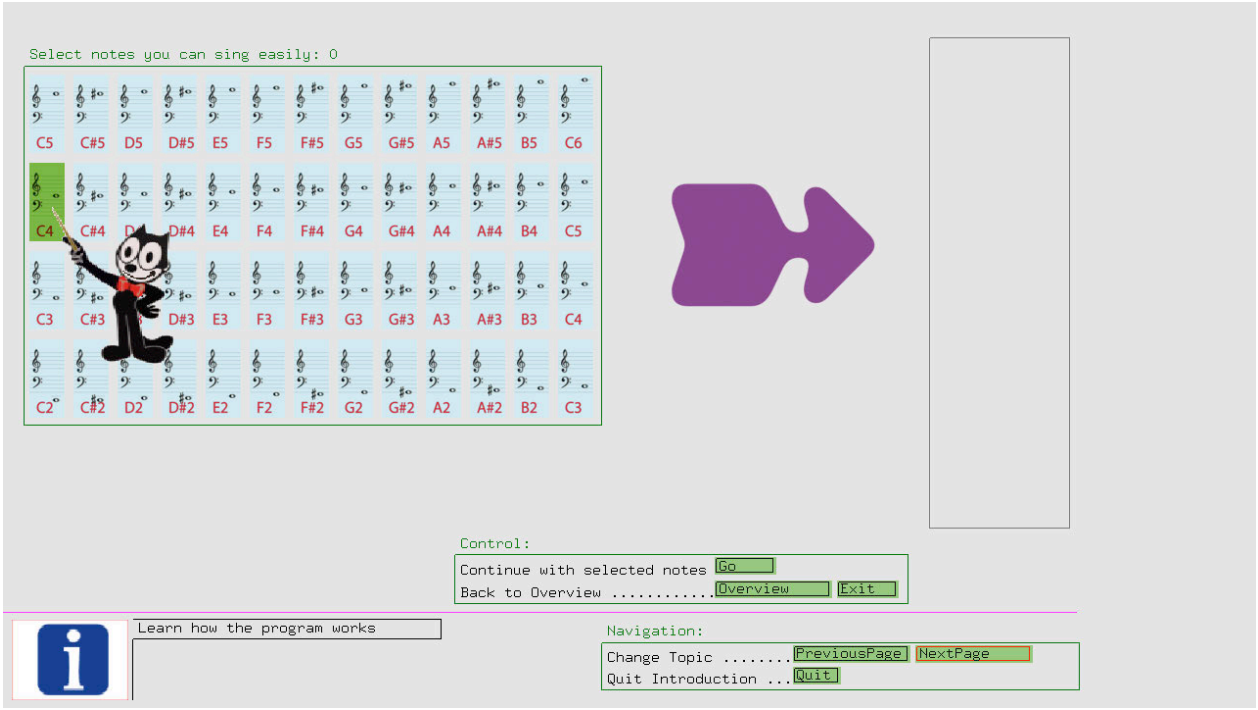
If you start the test for the first time, you are asked to select four notes.



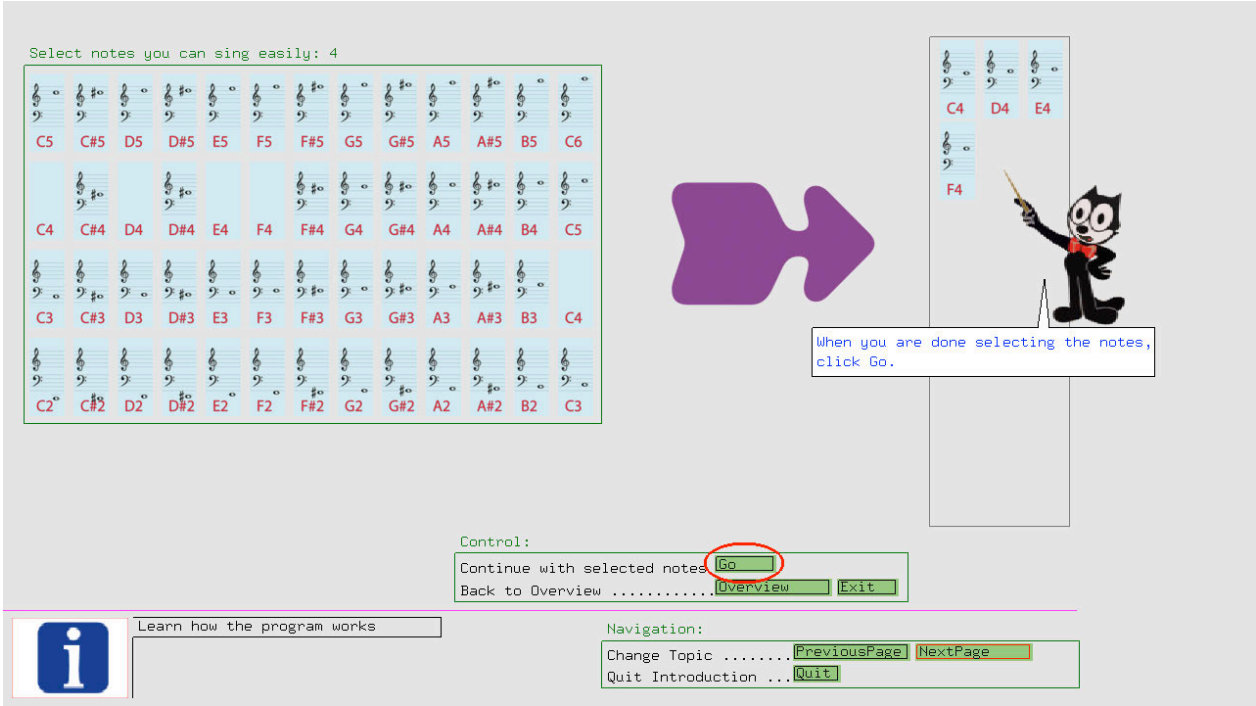
Whenever you want to select or change the notes, click “Select Notes” button.



Clicking the button “Select Notes” brings up the select notes dialog.



Clicking a note selects or deselects the note for the test.

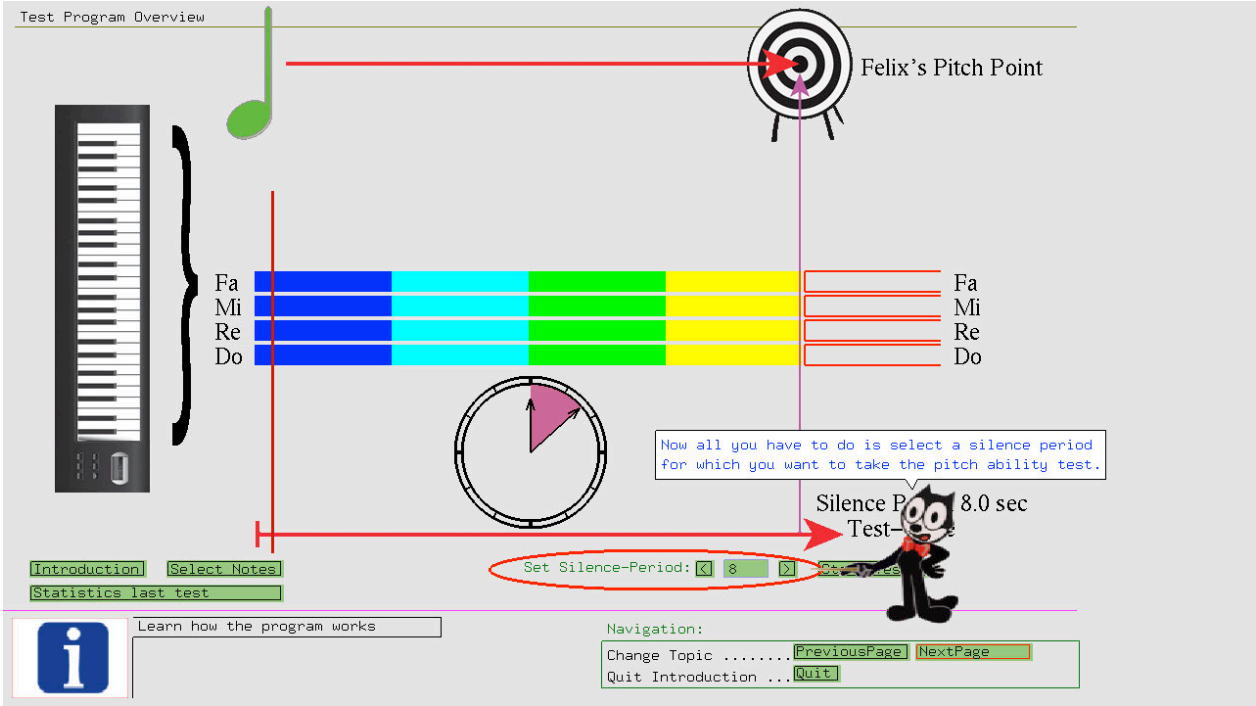


When you are done selecting your four notes for the test, click “Go”.

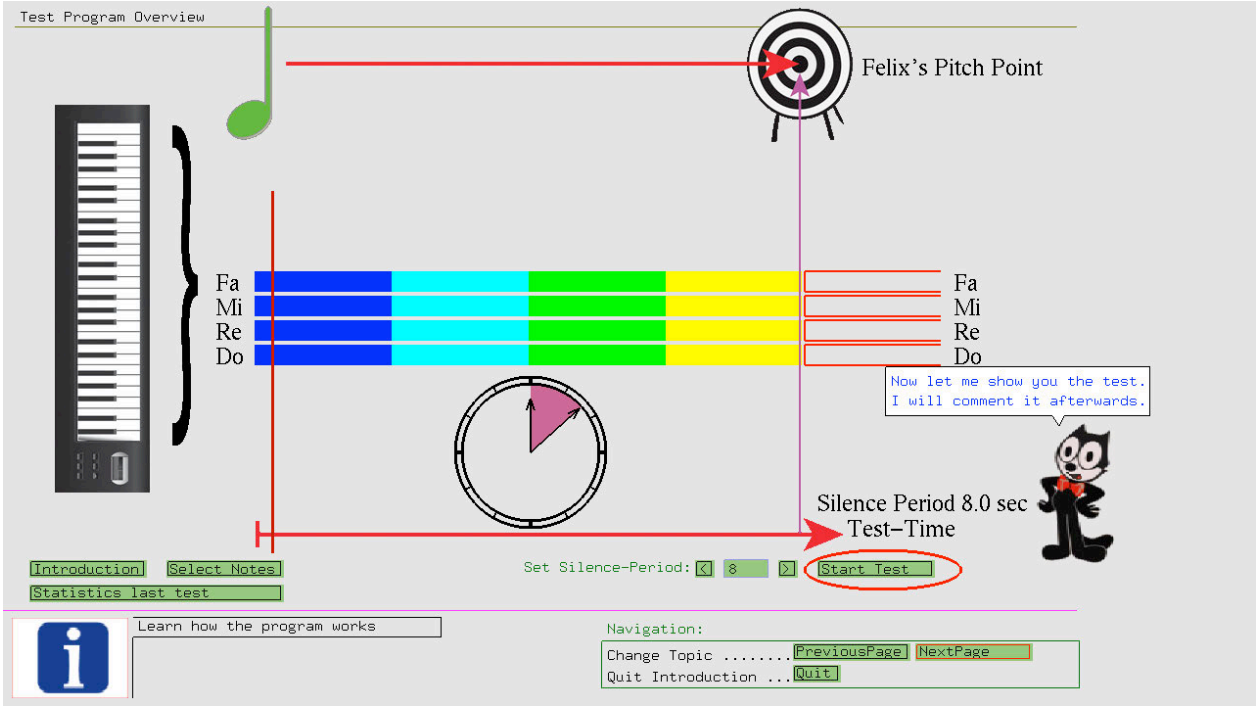
You are returned to the Pitch Ability Test Overview screen.

Selecting a Silence Period and Starting the Test

Now, all you have to do is select a silence period for which you want to take the pitch ability test.



The delay time – or period of silence – is the time, between hearing the note, and when you start to produce it by singing or humming it.

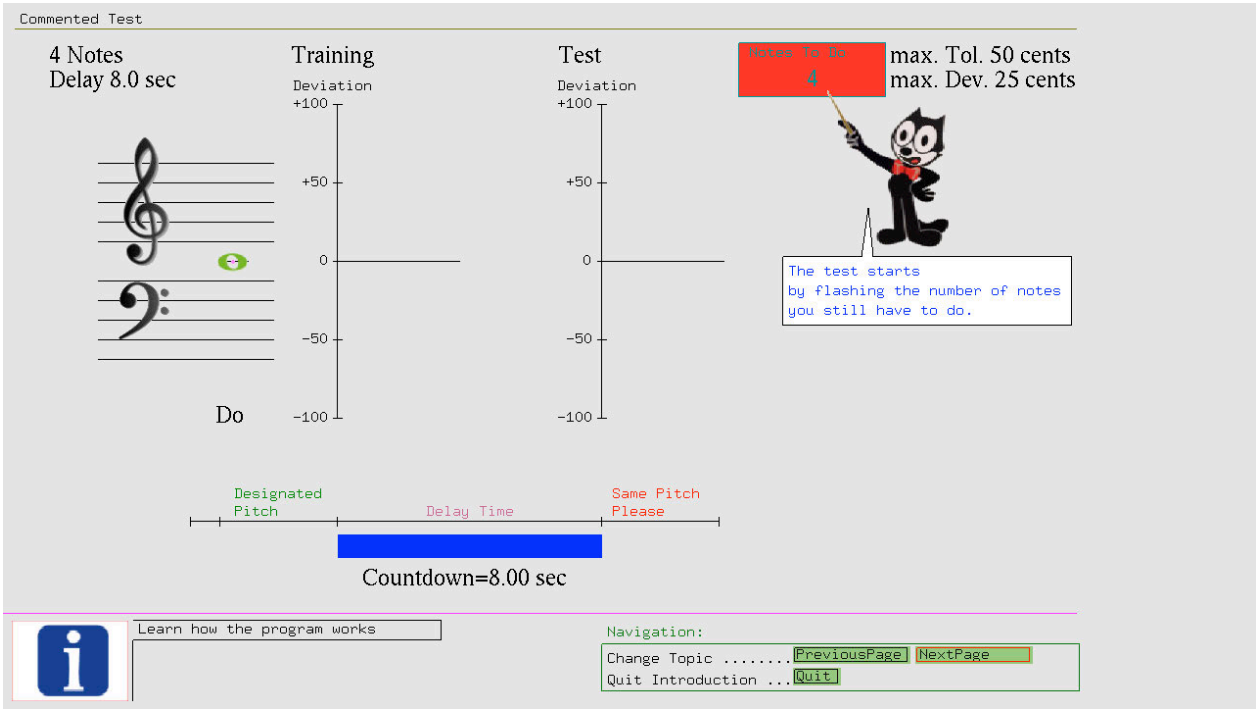


Clicking "Start Test" starts the test.

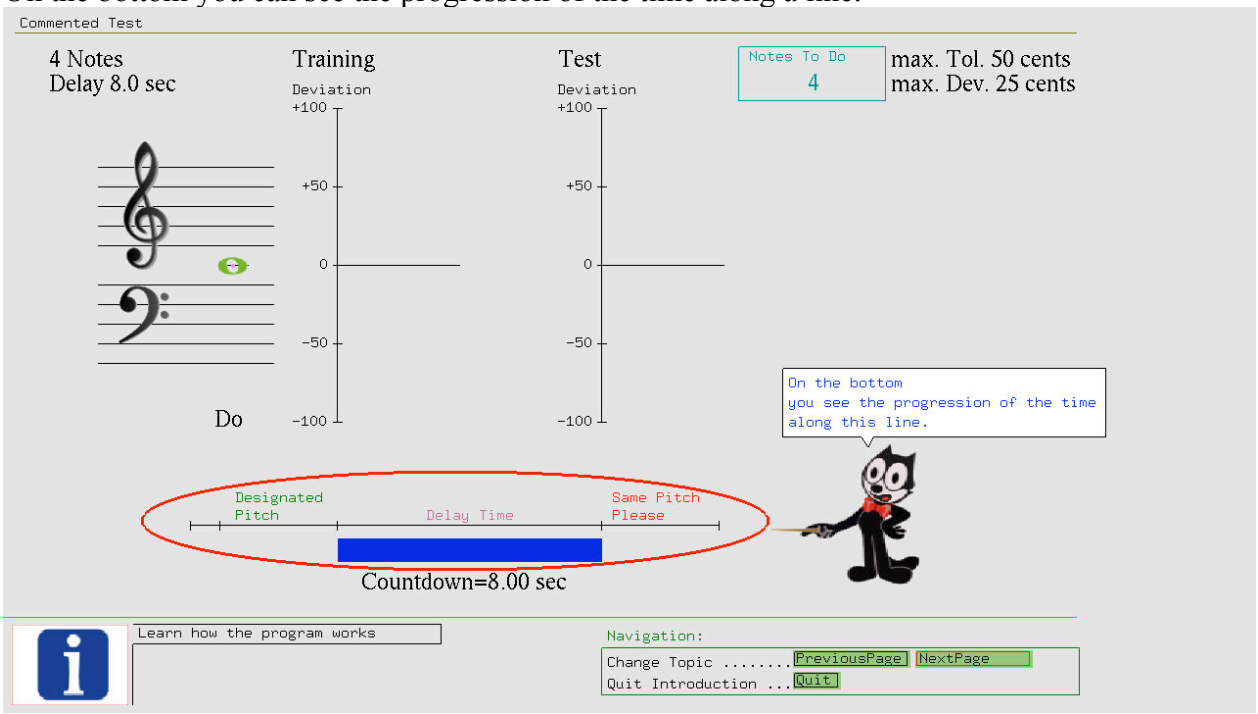
The Pitch Ability Test

The order of events during the test

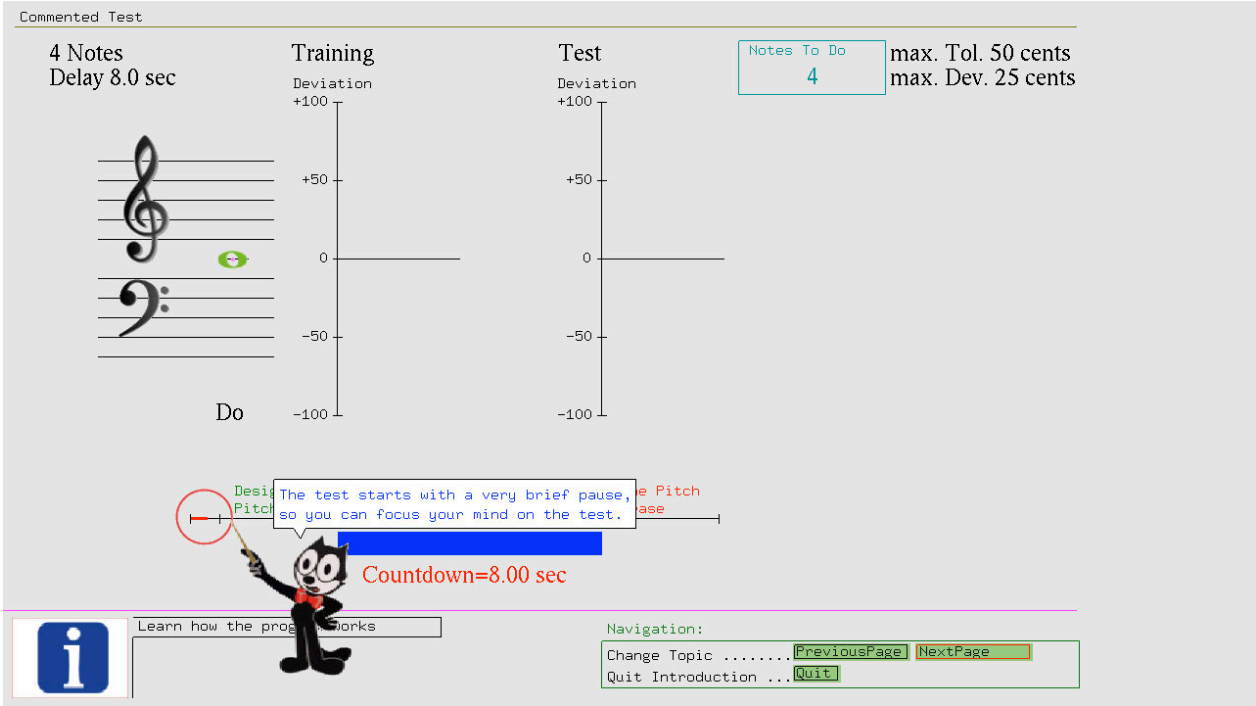
The test starts by flashing the number of notes you still have to do.



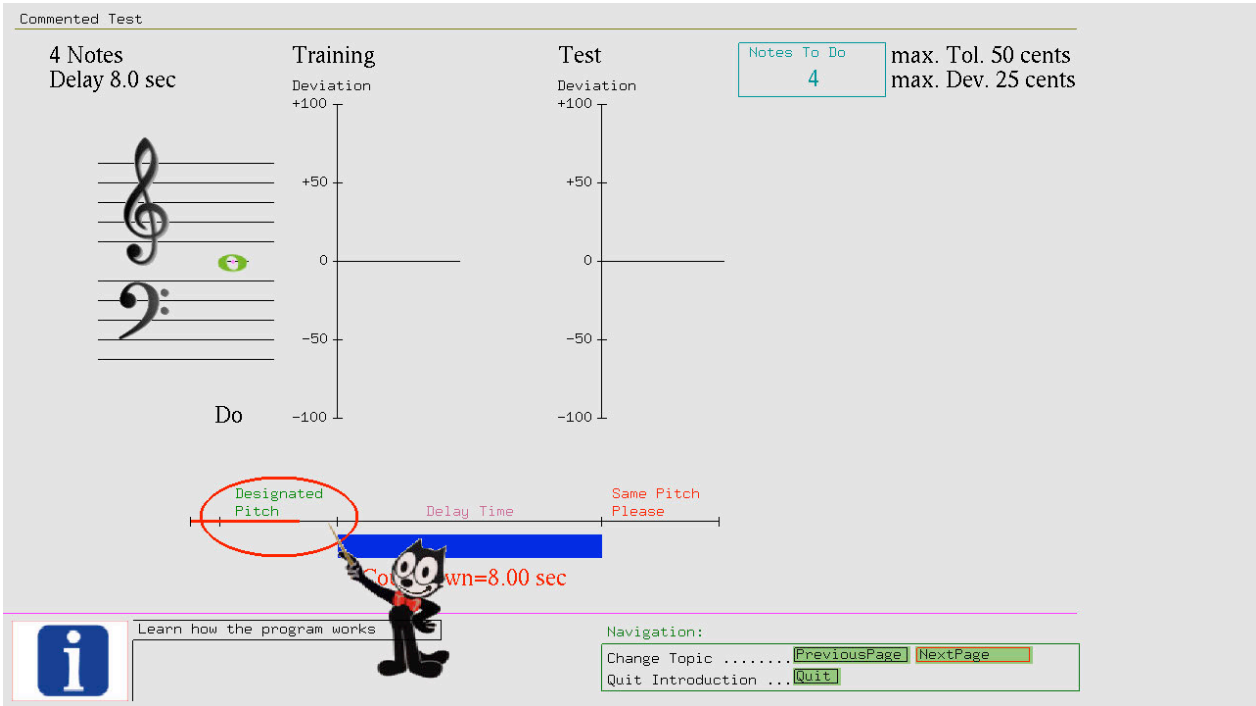
On the bottom you can see the progression of the time along a line.



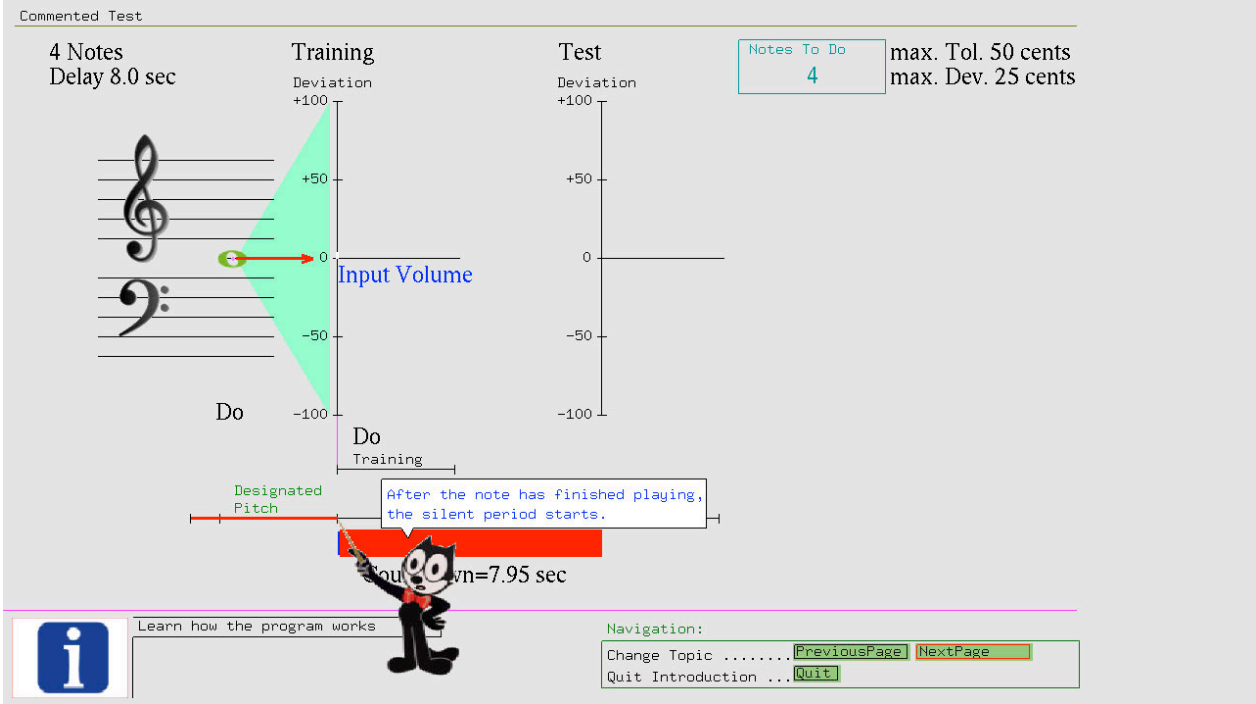
The test starts wit a very brief pause.



Next the note you must afterwards sing is played

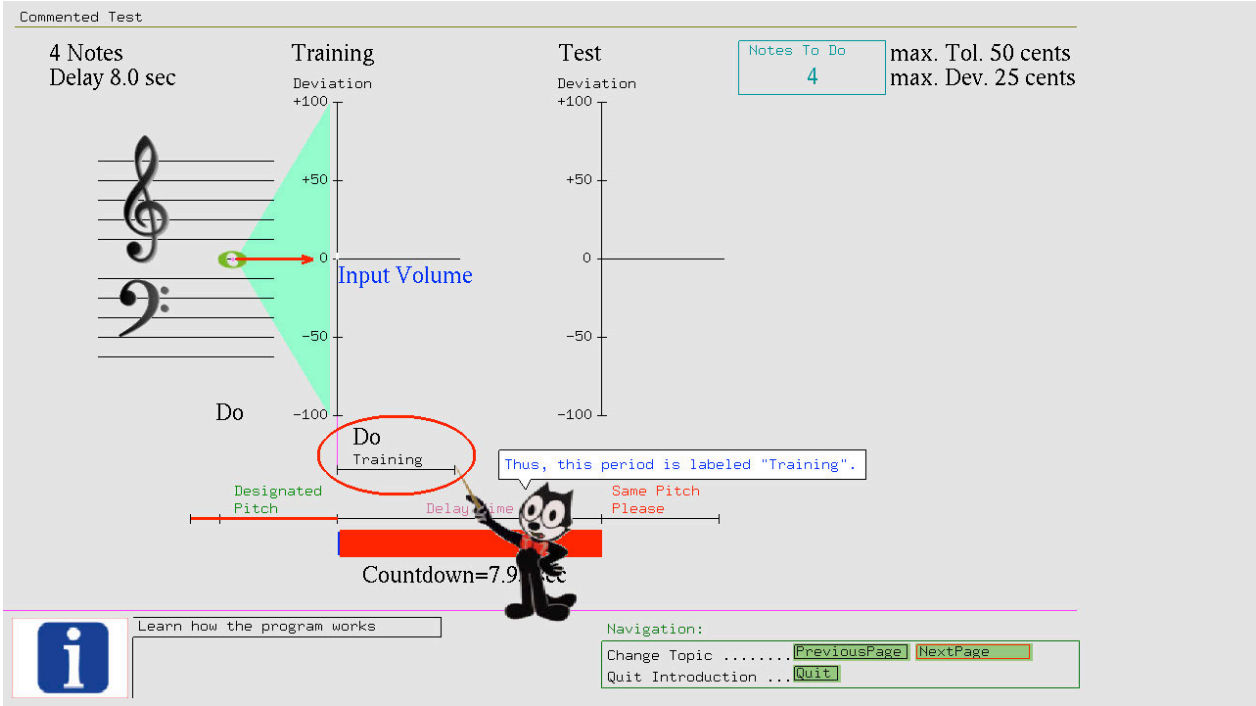


After the note has finished playing, the silent period starts.

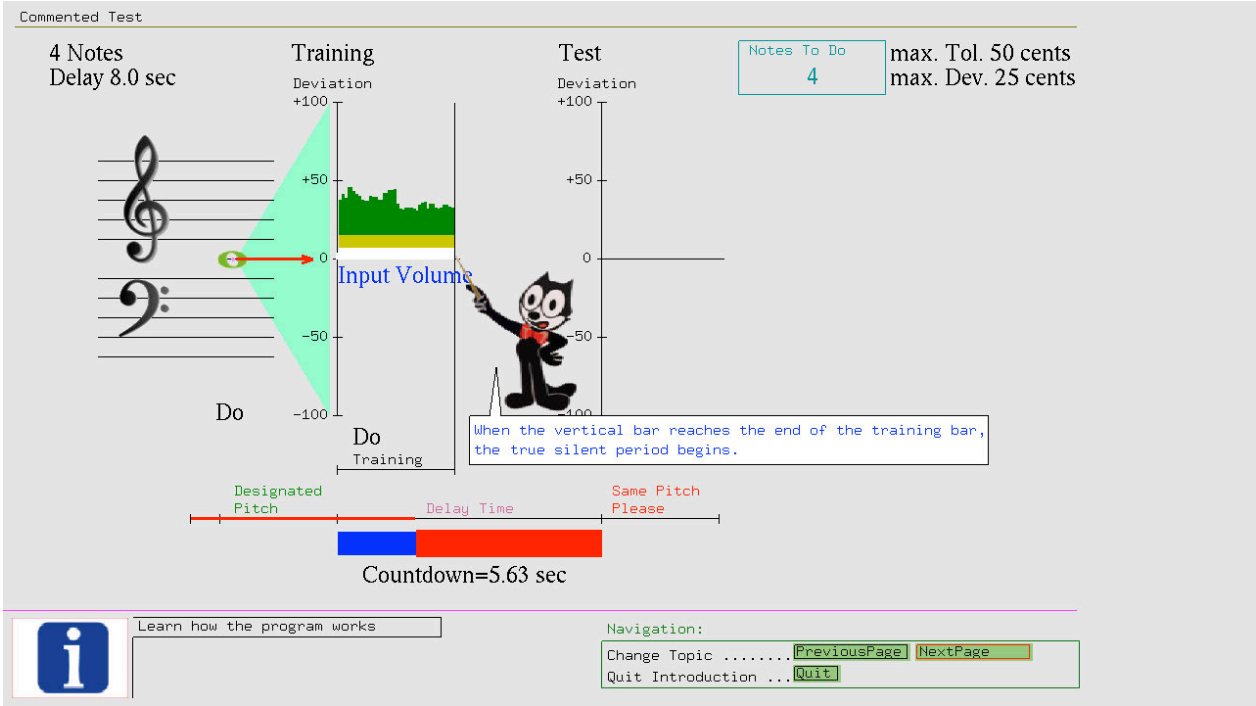


However, you don't have to be silent yet. The test allows you to sing the note immediately after it has sounded. We recommend that you use these allowed 2 seconds to adjust your vocal cord muscles and to refresh your internalized muscle positions.

Therefore a new bar labeled "Training" appears. Note that the main progression line does not move with the same speed as the Training line. This is because the training line only represents 2 seconds, whereas the main progression line may represent several minutes. Therefore during the silence period there is a larger bar below the main progression line.

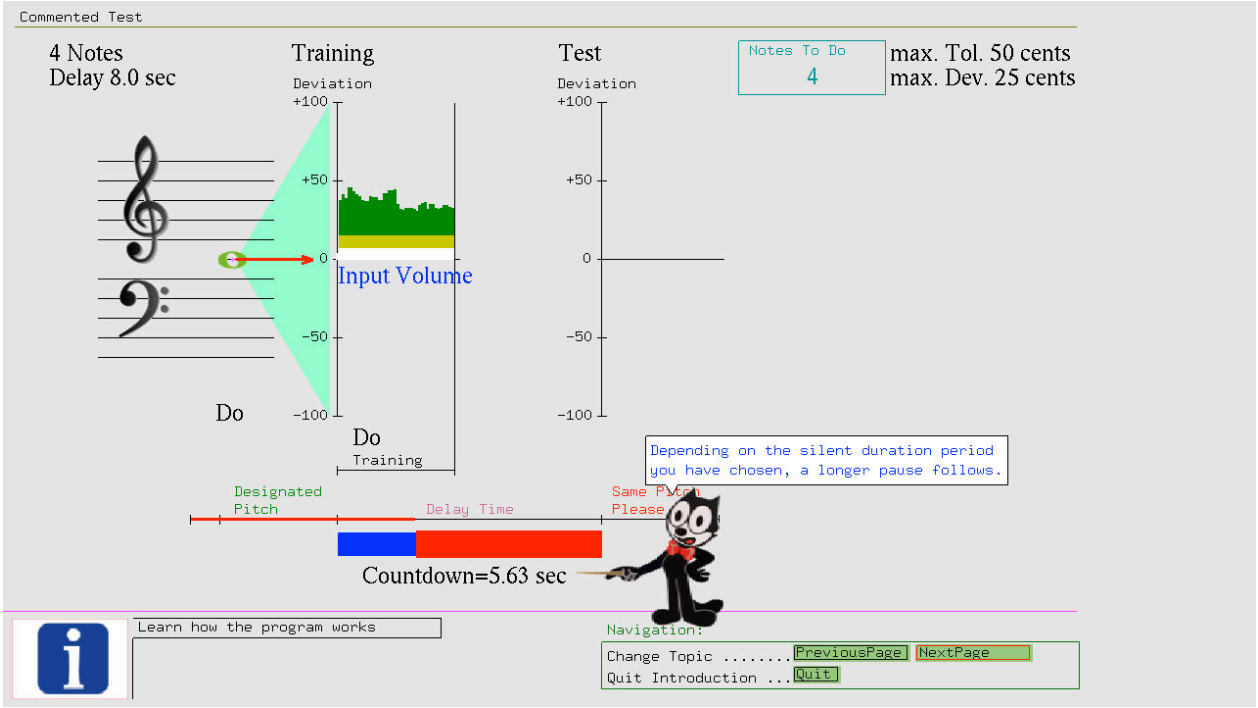


During this period the input volume is displayed, so you have the possibility to adjust your position to the microphone, if necessary.

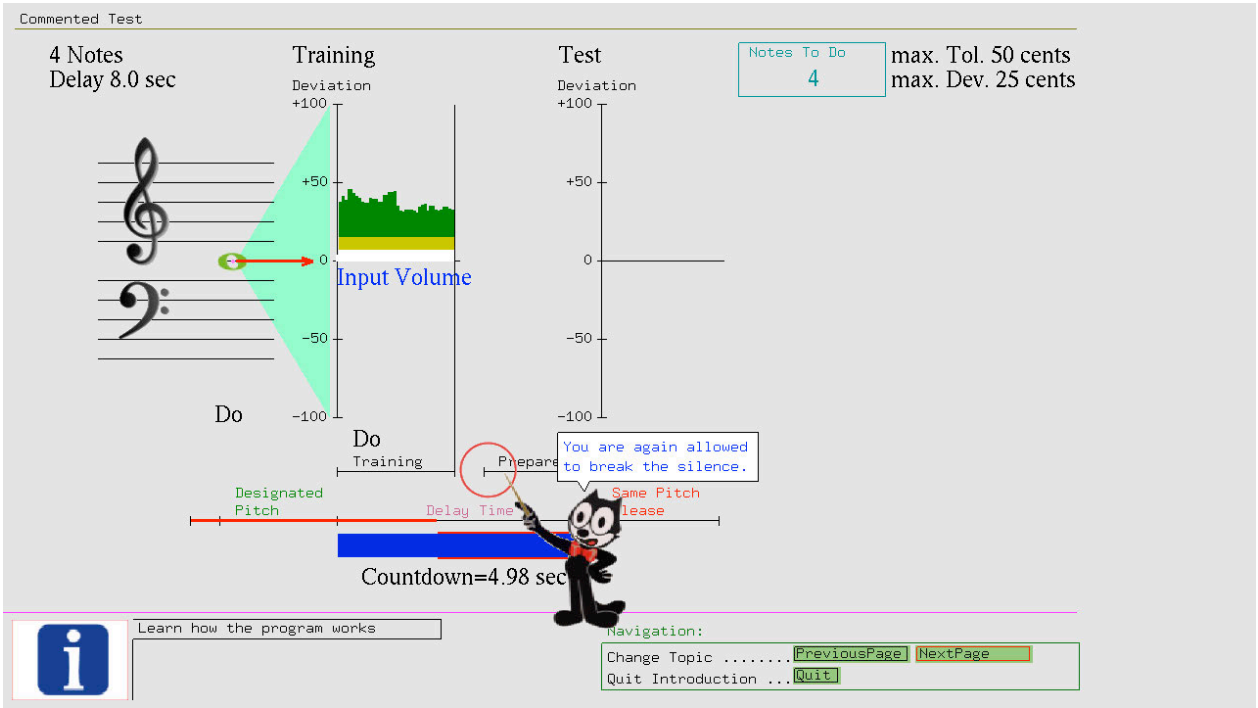


When the vertical bar reaches the end of the training bar, the true silent period begins. No more sounds are allowed.

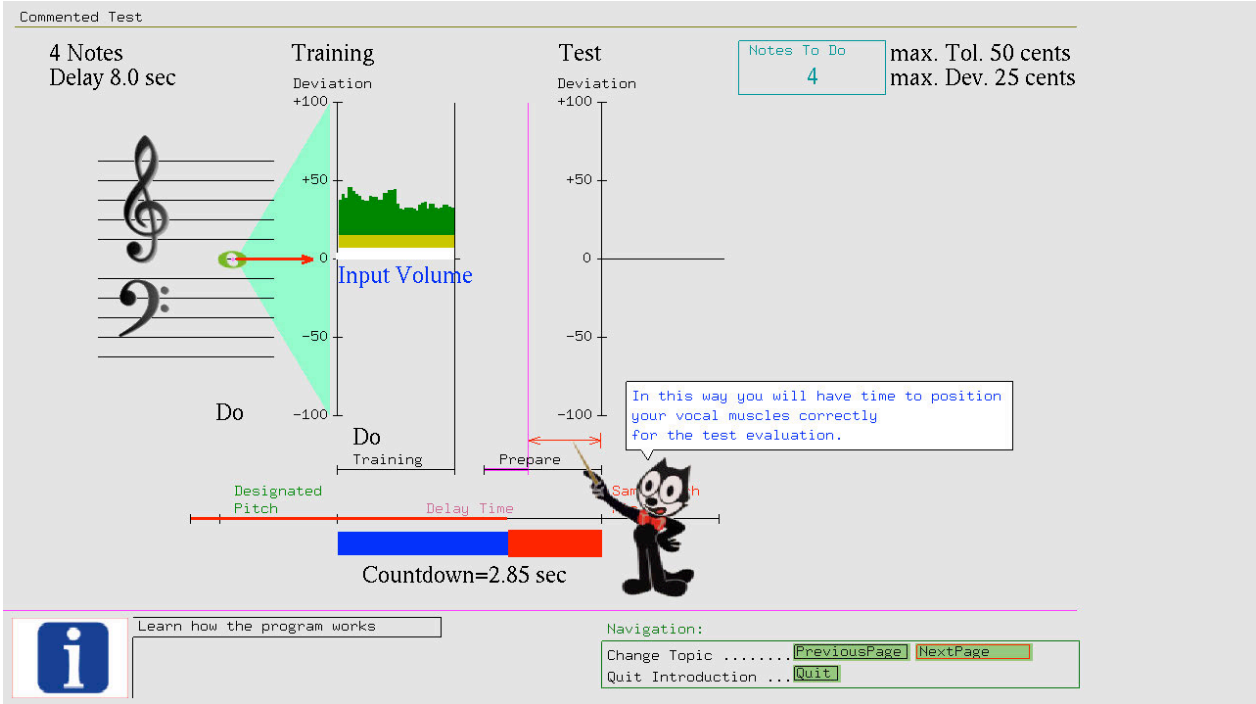
Depending on the silent duration period you have chosen, a longer pause follows.



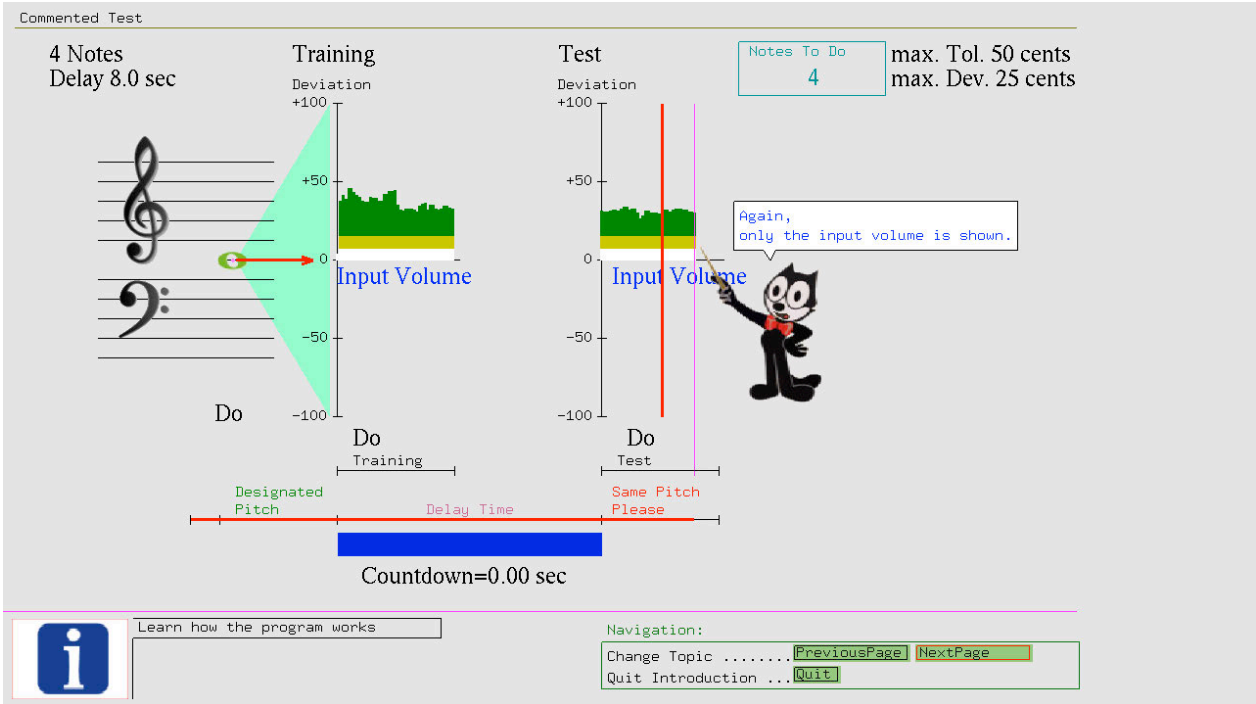
Five seconds before your pitch memory is tested, you hear a white noise. In case of a long silence period, this reminds you that you should get ready for singing. A white noise is a pitch-less sound, therefore it cannot be used as a reference sound. You are again allowed to break the silence. A new horizontal bar labeled “Prepare” appears, to show you the remaining time until you have to sing back the original pitch.



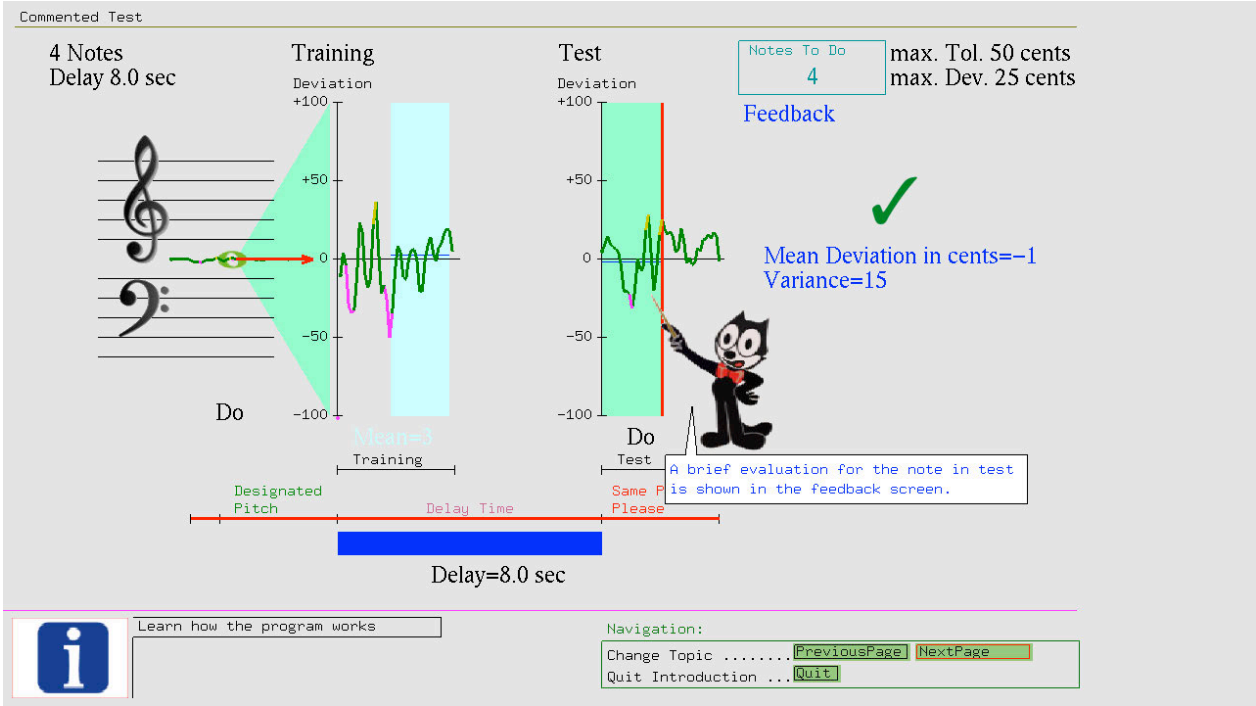
It is recommended that you start singing before the test-time is due. In this way you have time to position your vocal cord muscles correctly for the test-evaluation.



No visual feedback is given during this preparation phase. When the countdown reaches zero your singing of the memorized pitch gets evaluated. Again, only the input volume is shown.

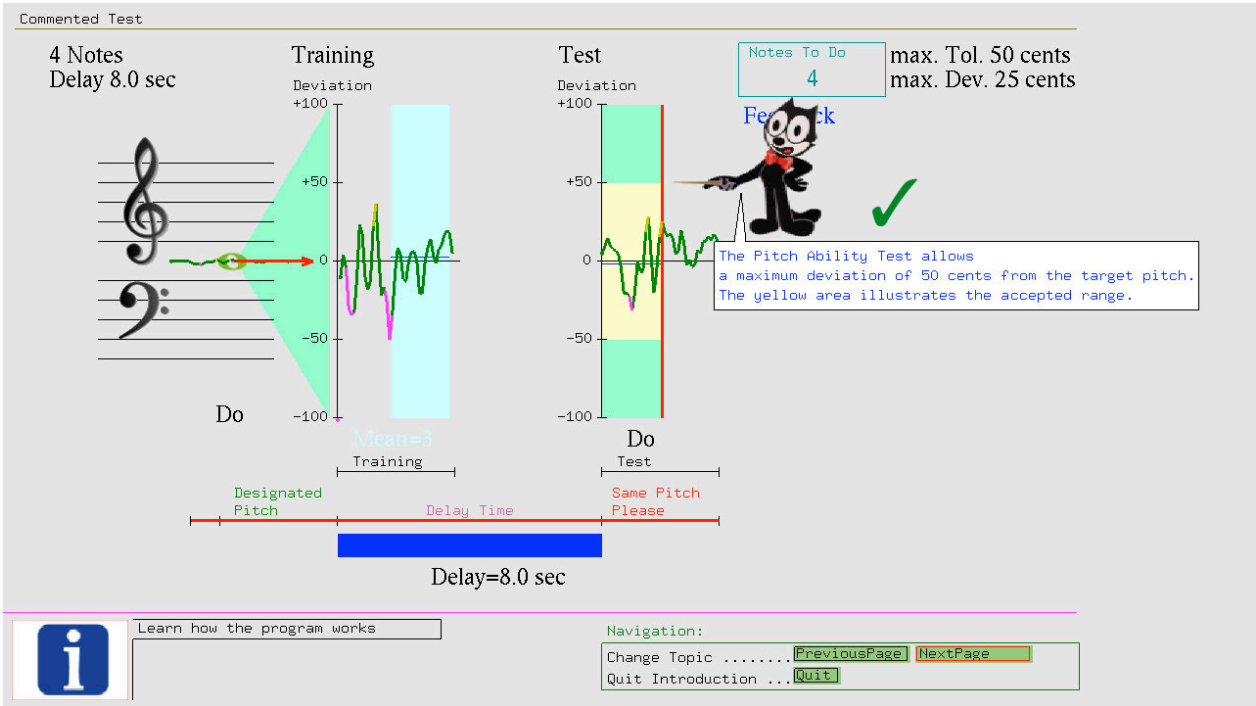


Because only one second of the pitch will be evaluated, after a second elapses, a red bar appears. The test phase ends after two seconds. And a short feedback for the note in test is given.

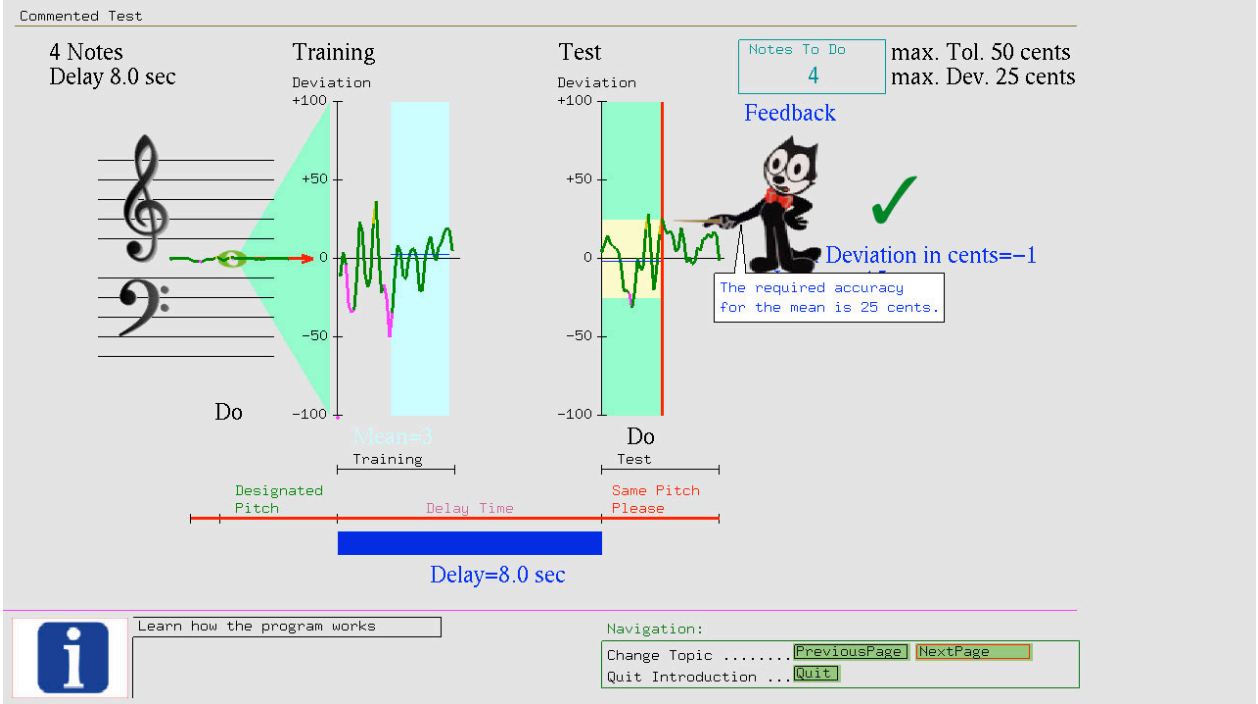


The feedback screen shows you the colored pitch curve for the note in test.

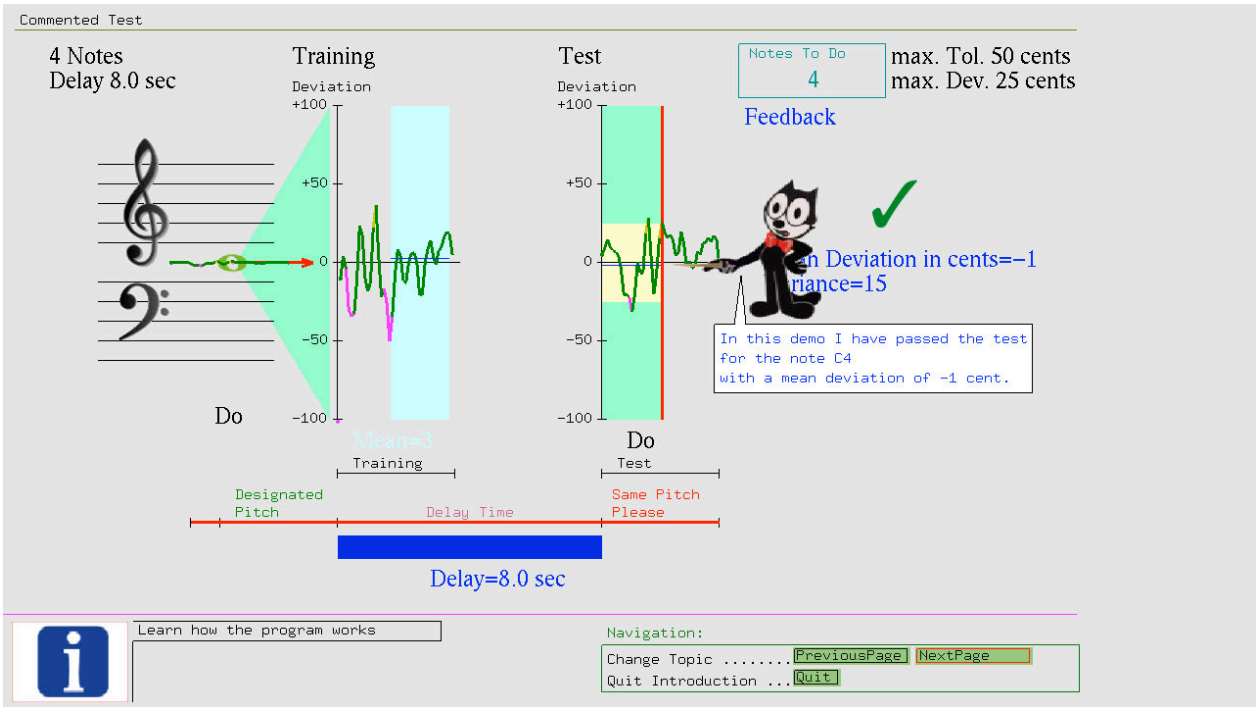
The Pitch Ability Test allows a maximum deviation of 50 cents from the target pitch.



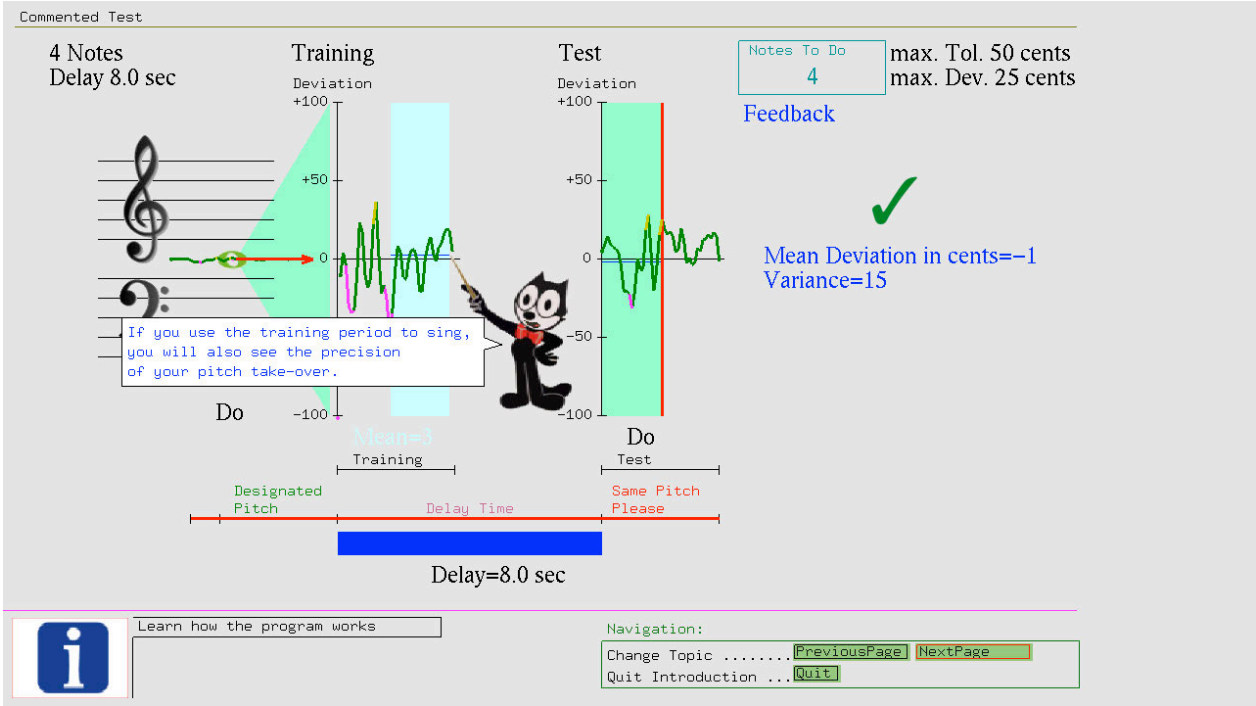
The required accuracy for the mean is 25 cents.



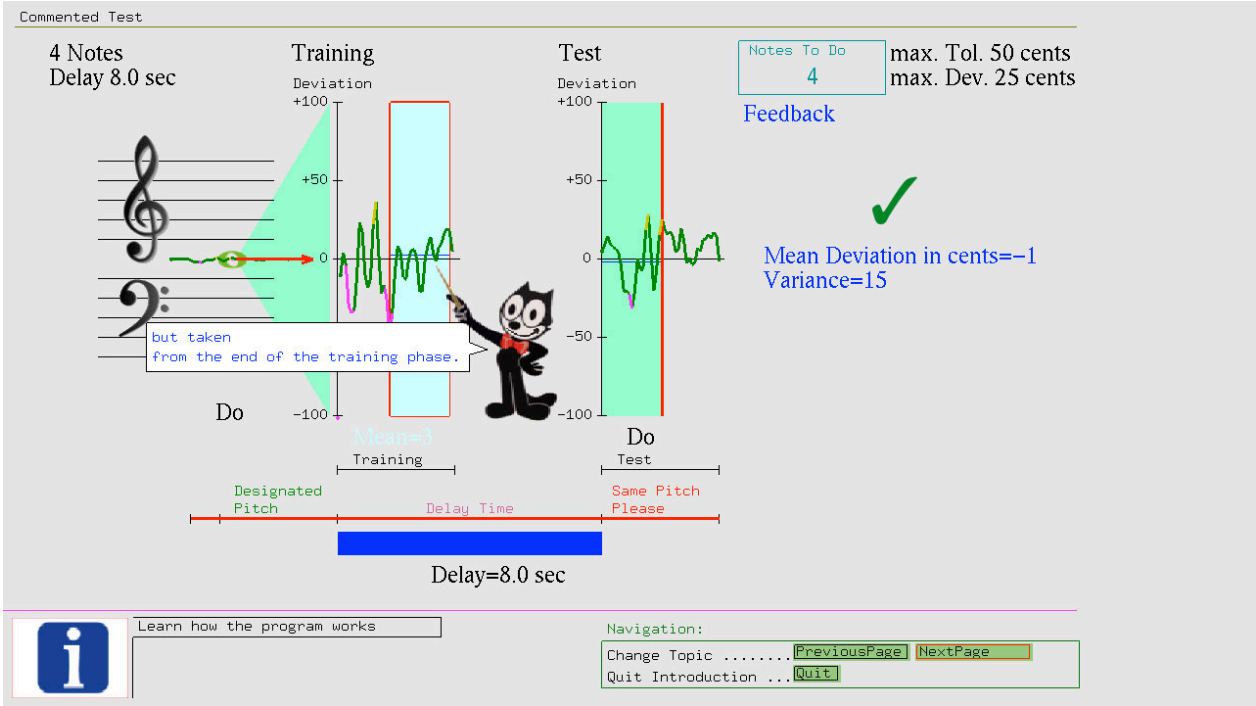
In this demo I have passed the test for the note C4 with a mean deviation of -1 cent.



If you used the training period to sing, you can also see the precision of your take over.



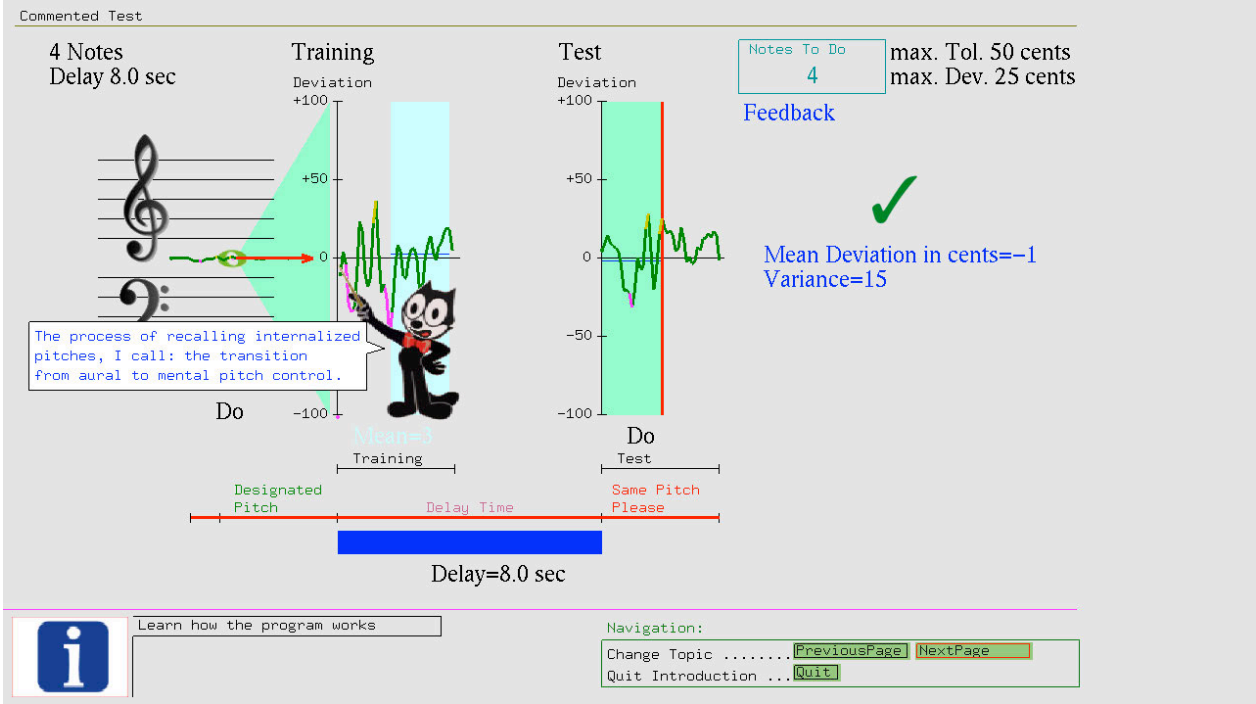
The pitch take over is not calculated from the beginning, but taken from the end of the training phase.



This is by intension. This way you get time to adjust your vocal cords without overlapping with the reference sound. The idea is that you start singing after you have listened to the pitched sound. In this way you have to internalize the pitch. Because if you start singing when the pitch is

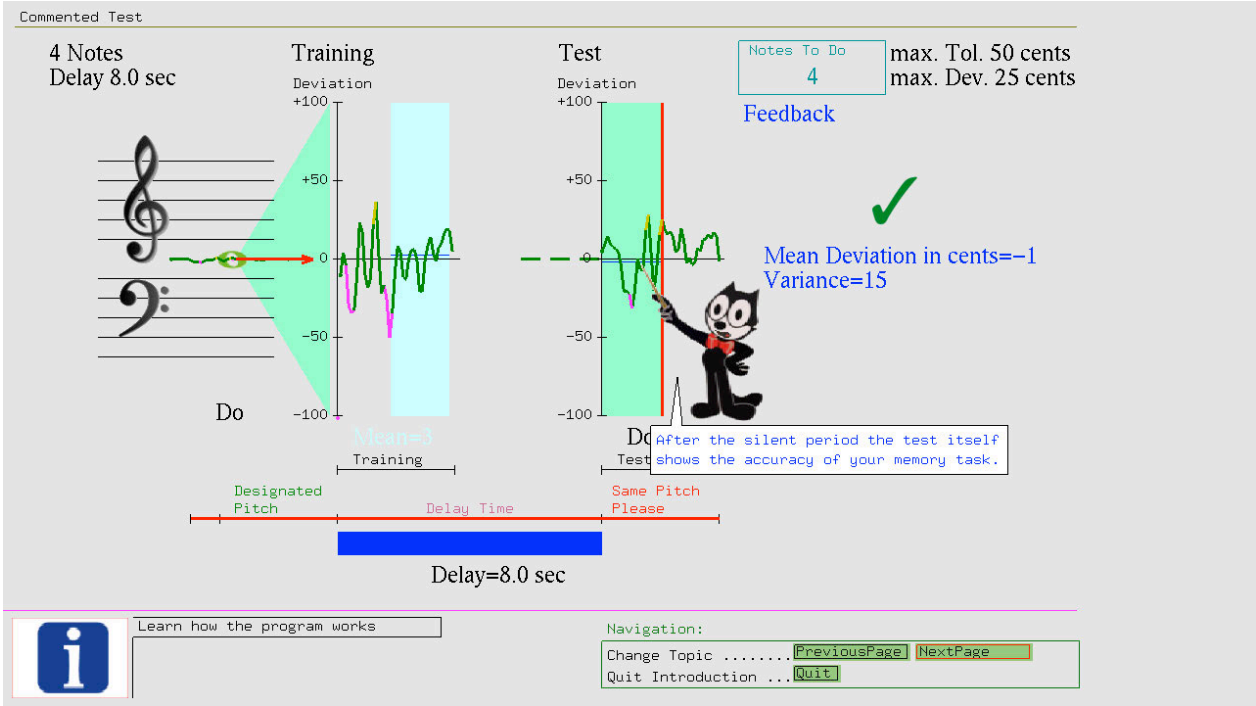
playing, you will adjust your vocal cords by coordinating the muscles aurally. That is okay in the beginning. But later you should start recalling muscle positions from internalized memorizations.

The process of recalling internalized pitches, from aurally coordinating the muscles to recalling muscle positions, I call: the transition from aural to mental pitch control.



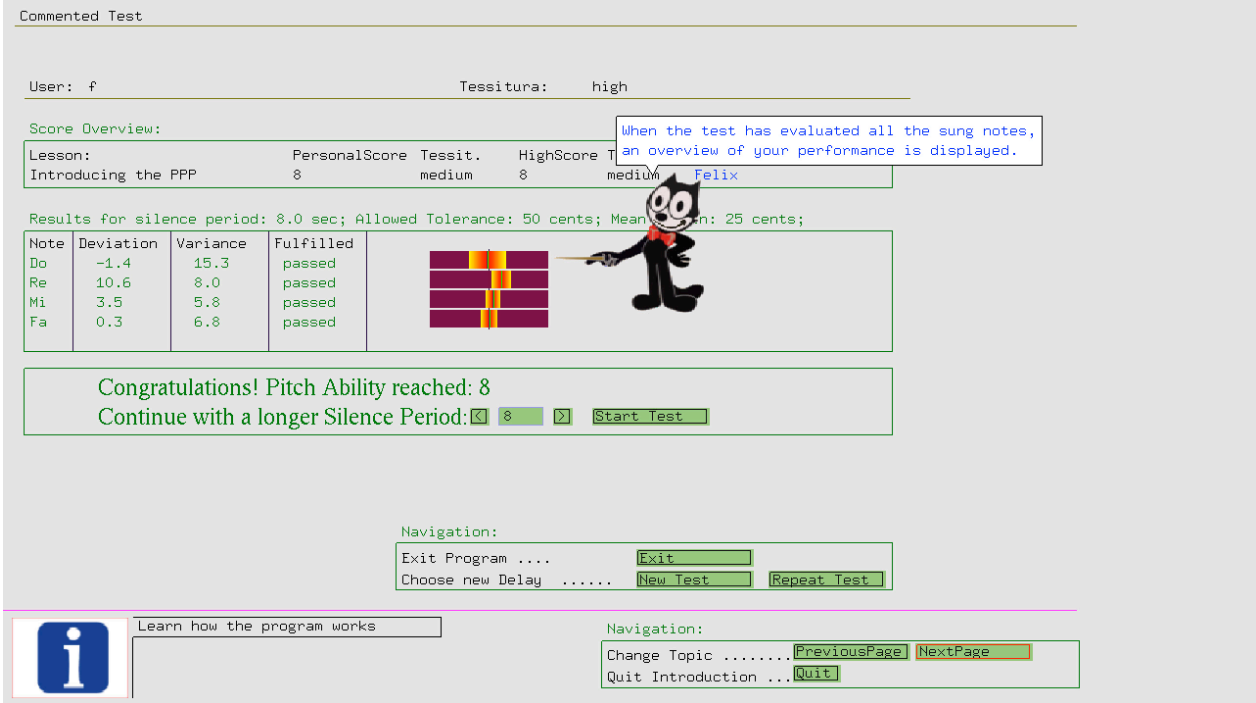
If your pitch take-over is not good enough, you should work on the precision take-over, before trying to enlarge the silent period.

After the silent period – the test itself shows the accuracy of your memory task.

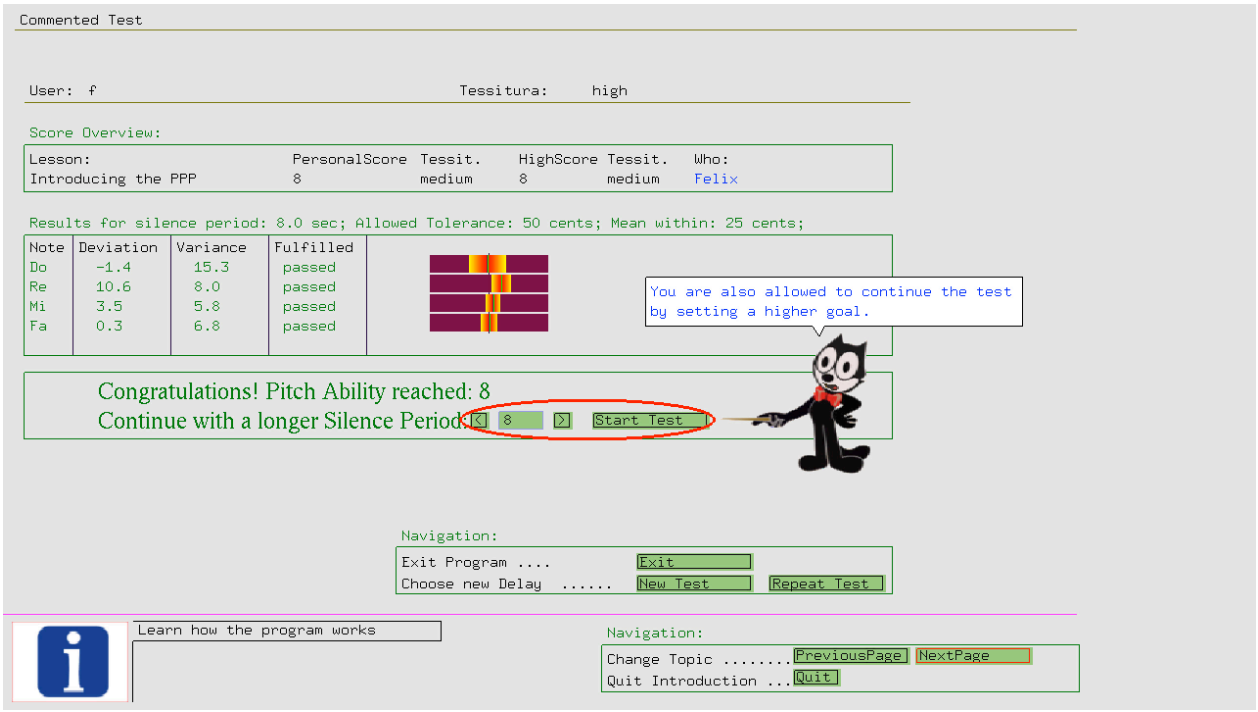


The feedback screen displays for about a second. Then the test automatically continues with the remaining three notes.

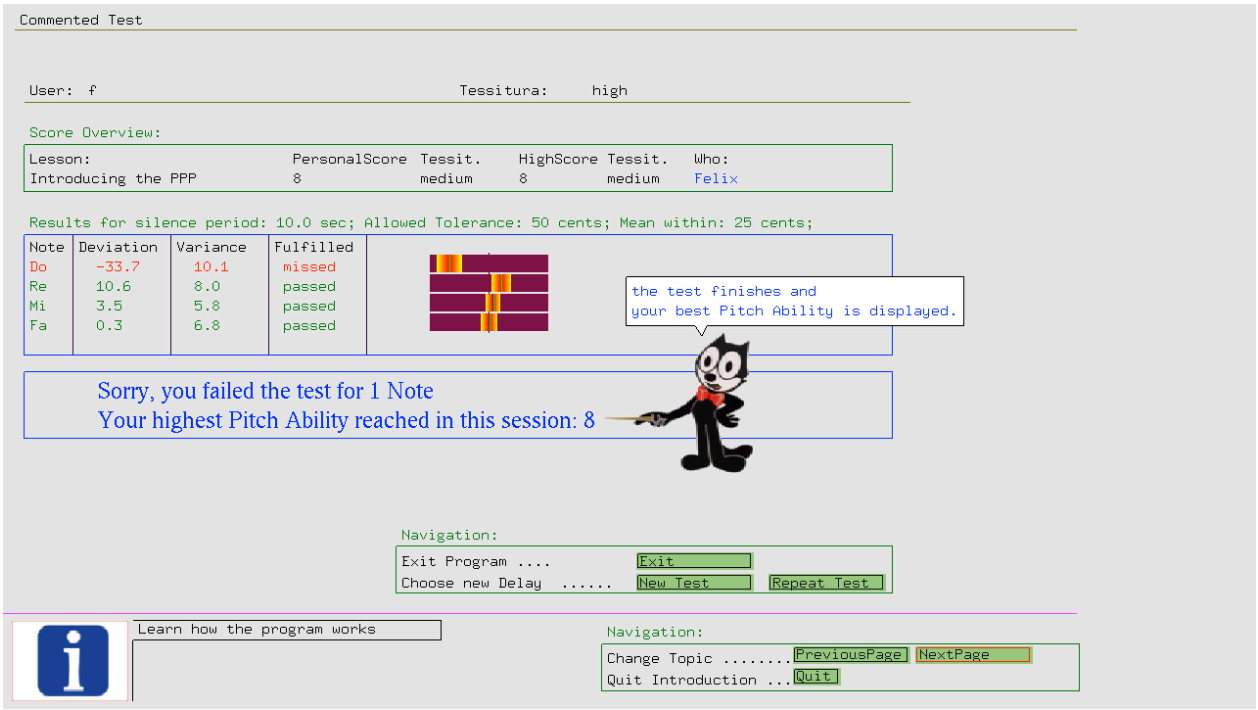
When the test has evaluated all sung notes, an overview of your performance is displayed.



For each note the deviation and variance is shown. If you passed all 4 notes, then your current Pitch Ability in seconds is shown. And you are also allowed to continue the test be setting a higher goal.



If you fail in executing one of the notes, the test finishes and your best Pitch Ability is displayed.

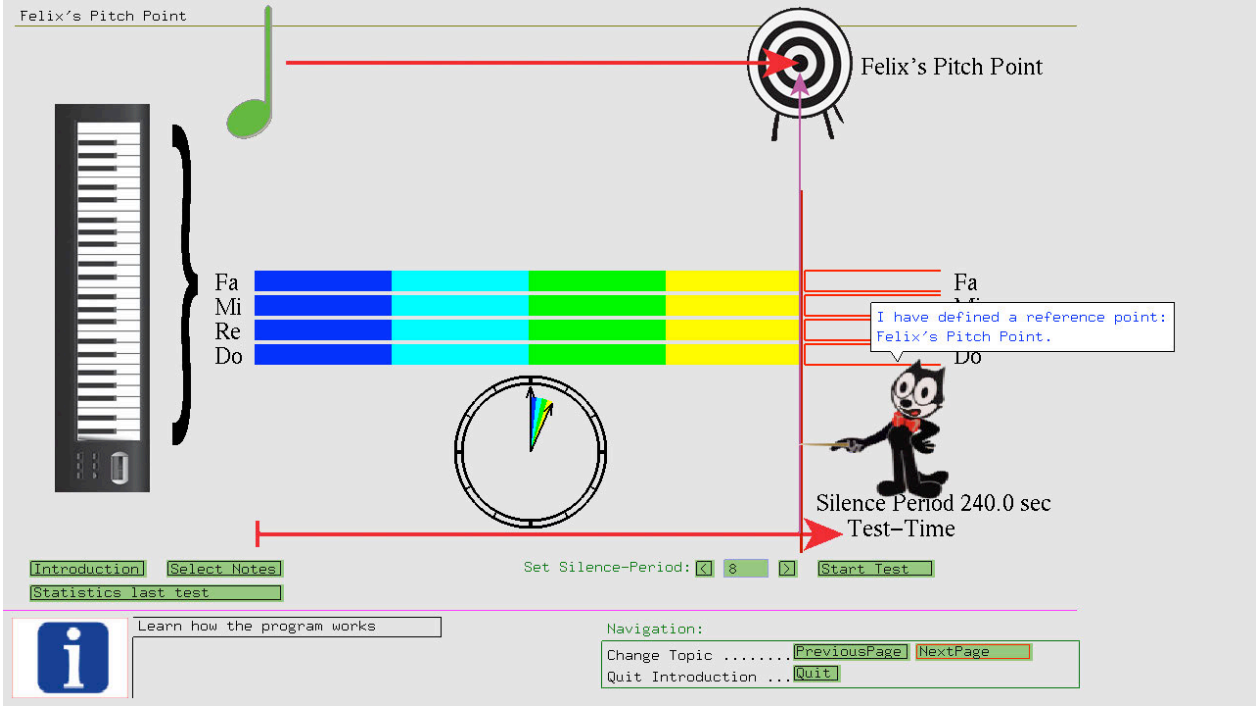


If you fail a note with your starting duration of silence, then, of course, no score can be given.

This procedure is similar to high jump sports, where you set your targeted goal and continue until you fail. Therefore you should select your silence period with care. Starting with a too short period, may fatigue and hinder you to reach your best performance. Starting with a too long period bares the risk of getting no result at all.

Felix's Pitch Point

Because the time is open-ended – but we don't have unlimited time for a test – I have defined a reference point: Felix's Pitch Point.

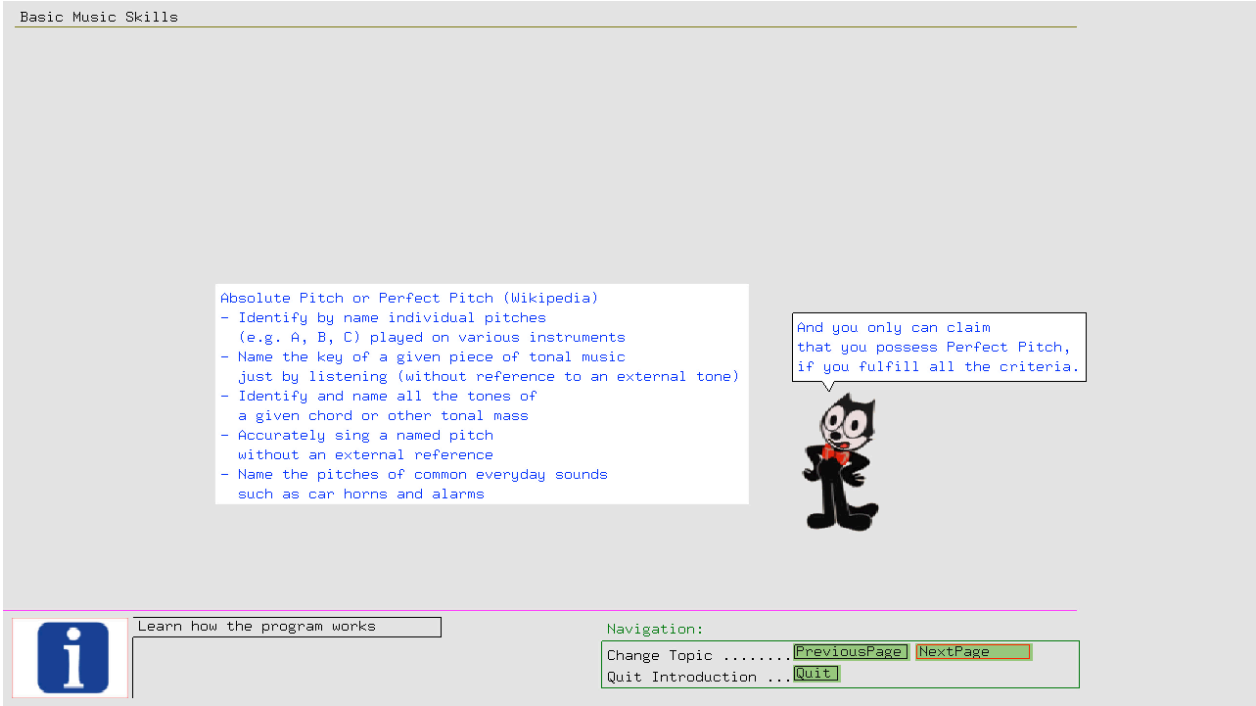


Felix's Pitch Point appears at 4 minutes. Four minutes, because that way testing the four notes takes less than 20 minutes. And usually, if you can correctly remember pitches – without cheating – after 4 minutes, then you can also remember them after an hour.

The Pitch Ability Test gives you a handle to train the ability to keep a pitch in your mind for a longer time. You will feel, when it becomes harder to improve. The test lets you improve this ability since the feedback, the Pitch Ability indicator, tells you where you are.

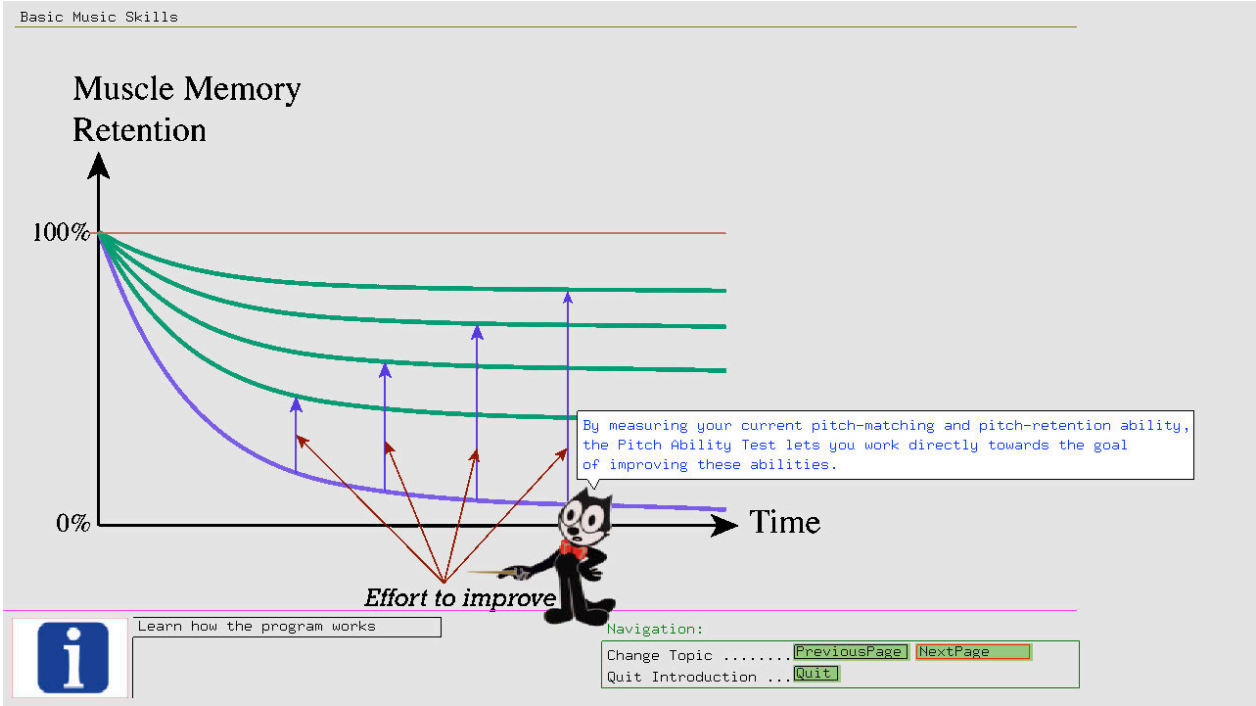
Why is the Pitch Ability Test a trailblazer for absolute pitch?

Wikipedia list several abilities you must be able to perform to claim that you possess absolute pitch. If you do not fulfill all criteria, you simply know that you don't have absolute pitch.



There is nothing in between, that says for example: you have reached a score of 90 out of 100 for absolute pitch. The lack of a continuous measure makes the process of achieving perfect pitch even more difficult.

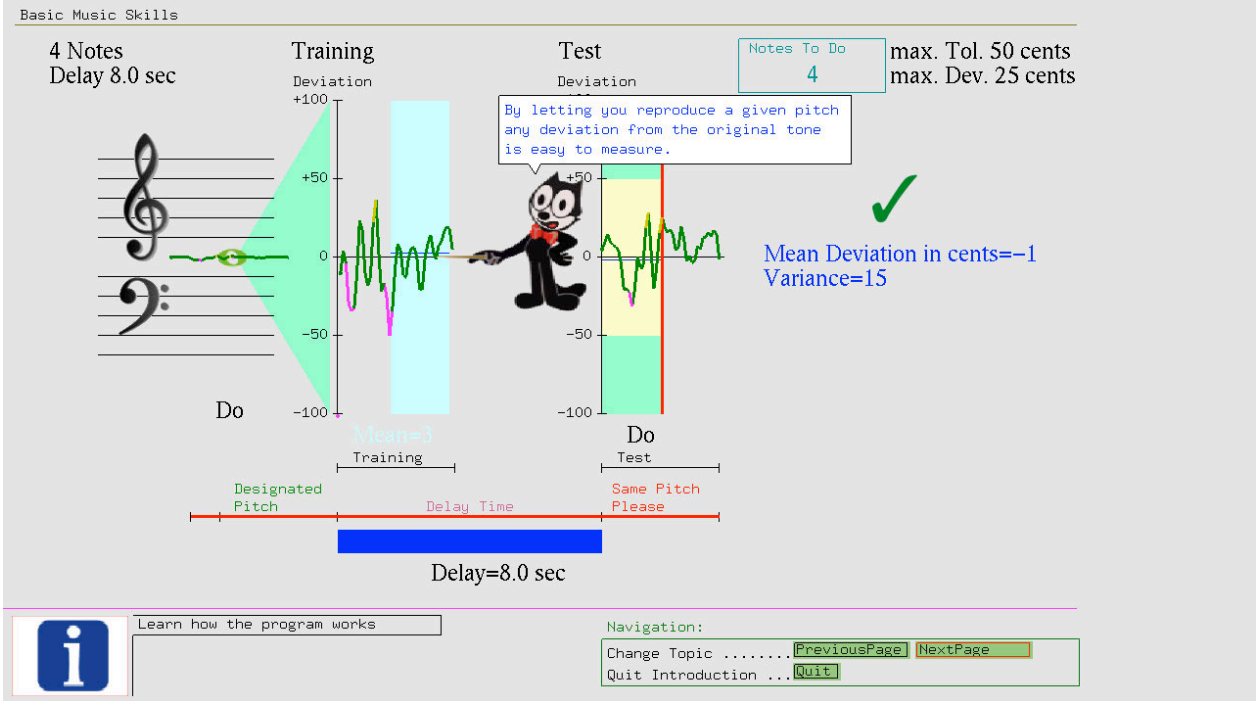
However, if you analyze the required skills, one feature stands out: Accurately sing a named pitch without an external reference tone. Since perfect pitch is a catchphrase with no generally accepted specification, I have decided to introduce the Pitch Ability Test. A test that allows you to technically measure your Pitch Ability.



By measuring your current pitch-matching and pitch-retention ability, the Pitch Ability Test lets you work directly towards the goal of improving these abilities. Since the Pitch Ability Test allows you to measure the most important skill of Absolute Pitch: to – Accurately sing a named pitch without a reference tone – it is a trailblazer for acquireing absolute pitch. Absolute Pitch requires recalling pitches accurately even after a day, which is way beyond Felix's Pitch Point at 4 minutes.

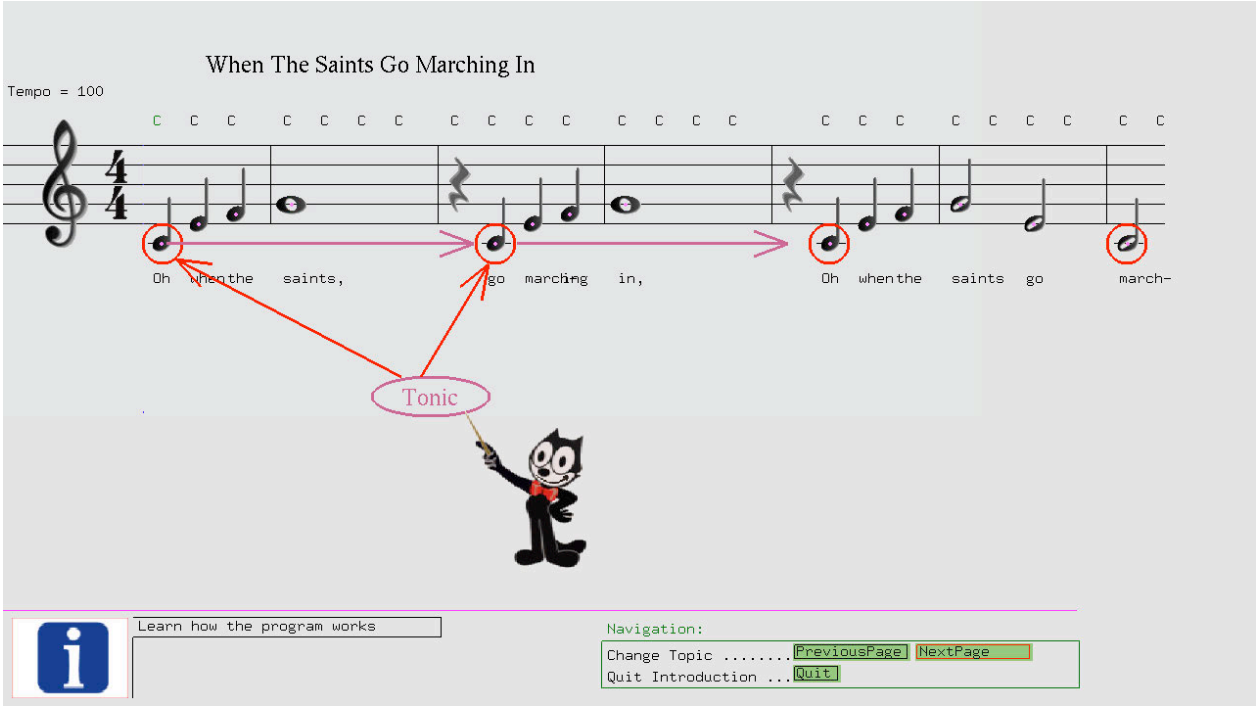
Why is the Pitch Ability Test an assessment of basic music skills?

First, with the requirement of singing you can directly measure the ability to take over a pitch. By letting you produce a given pitch any deviation from the original tone is easy to measure.

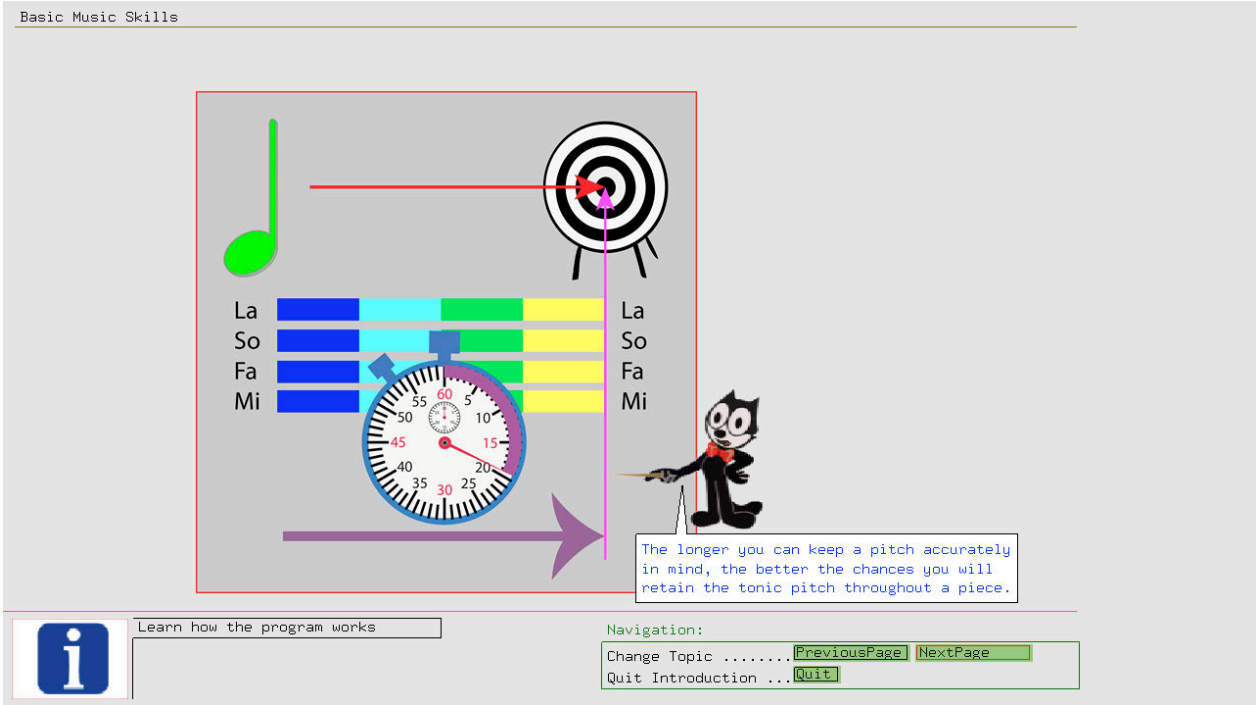


To measure the precision take-over of a pitch is very useful, since without it, you are not able to sing a song in a required key. To be able to match a pitch – independent of any tuning system – is the essential skill for making music in a group. And therefore is a basic music skill. Harmony, for example, can only be achieved, if the instruments are synchronized pitch-wise.

Second, the Pitch Ability Test measures how long you can retain accurately. In many songs, the first tone is the same as the last tone, illustrating the idea of a central or “home” key. The individual tones of a melody are linked together through this common tone: called the Tonic.



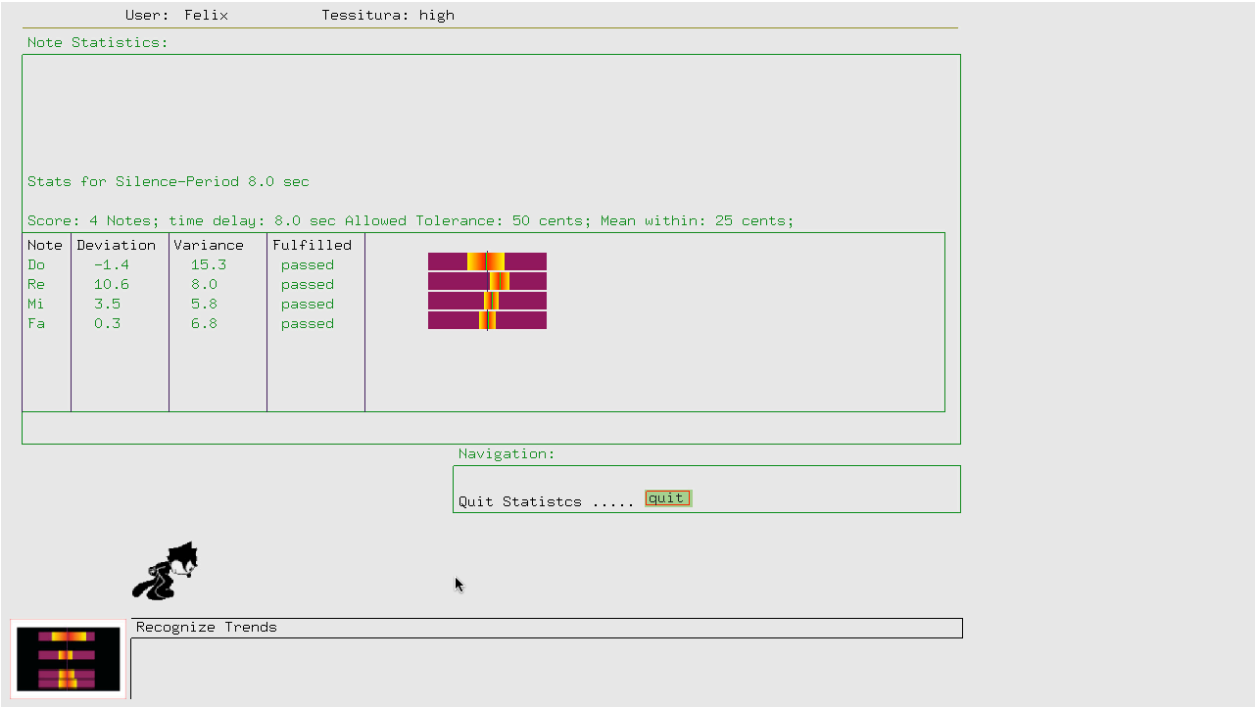
Therefore, to keep a pitch in mind throughout a piece also forms a basic music skill. The longer you can keep a pitch in accurately in your mind, the better the chances you will retain the tonic pitch throughout a piece.



Thus, the Pitch Ability Test – even so intended for Perfect Pitch measurement – is also very useful for beginners.

Statistics

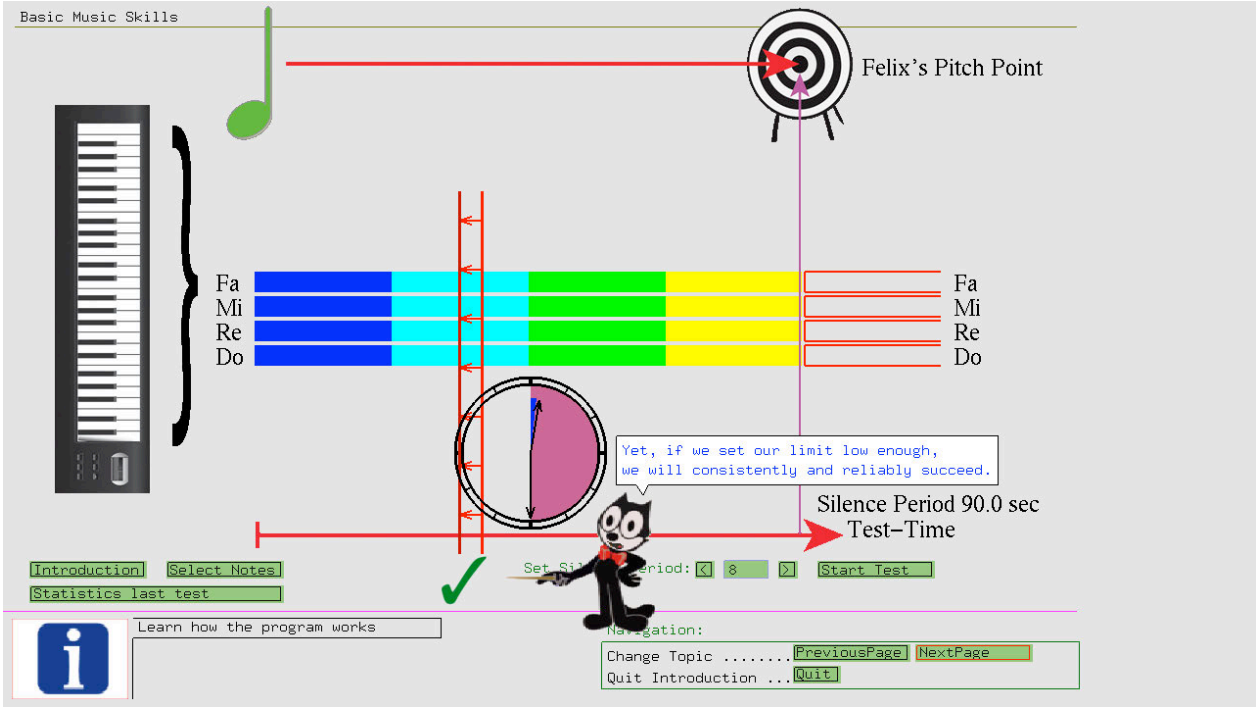
If it has been a long time since your last test, then click the “Statistics” button. The statistics screen will show you the last test and thus reveal your last chosen silence period, in case you have forgotten it.



The concept of the Pitch Ability Test

The Pitch Ability Test is not restricted to the same-named program. The concept of the test is independent of a computer. The test could be done with a stopwatch and a person with a good ear. The tester doesn't even need to possess absolute pitch; the tester is allowed to evaluate the produced pitch with any correct pitched sound. Of course this is not as exact as measuring the difference by a computer. But, it is not really relevant, if the tested person passes the test with 30 cents deviation or exact 25 cents deviation; less deviation is, of course, always better. Nor is it important that the mean is taken over exact 1 second. If the test is seriously executed, then you get a reliable result for the pitch ability. The important things to observe are: 1. That the silent-period is silent. 2. That a visual signal (or white noise) is used, when the test-time arrives. In essence: there should be no pitched reference sound during the silence period.

The biggest misperception is: that the test results seem to vary from day to day. At least in the beginning. But later, when you know where your limit is, you can start pushing that limit. Let me explain: When you pass the test with a silent period of 100 seconds, then you may be tempted to try a period of 110 seconds. If you fail, you may go back to 100 seconds and repeat the test. All of a sudden you may also fail for 100 seconds. This is, because your true limit is probably at 90 seconds.



To find your limit, you have to go back, until you find a point where you consistently and reliably pass the test. If you pass the test for 90 seconds during a week, then continue with a silent period of 91 seconds. Through this slow progression, you realize what the critical points are to stabilize the test results. This allows you to progress until you have truly found a way to internalize the pitch, so that you can recall it even after a day. Usually the error is that you try to cheat yourself: You do not try to memorize the pitch, but concentrate on keeping the pitch in your mind during

the whole silent period. Nothing is wrong with this. It is okay to first learn to keep a pitch in mind through concentration. But when the times get longer, you must begin to reliably internalize your concentrated state. That is, you must find a way to move an abstraction of the pitch to the long-term memory. Don’t worry! The brain will use the feedback and help you to perform the task. It is similar to learning a foreign language: it takes time. If it is worth the time for you, is yet another question. But if you truly try to figure out your reliable pitch ability indicator, you may start to acquire a liking for the test.

Tips for using the test

Microphone settings

For pitch exercises set the input level as high as needed, so you can sing comfortably without stressing your voice.

Environment

If possible, practice in a quiet room. Use a low noise computer and have as few as necessary electrical fields in the room; e.g., turn off your mobile phone and other equipment. Be aware that long microphone cables can cause audible disturbance. Finally, the room should have fresh air.

Recognize trends

To observe your progress is important. You will always have setbacks, however, if reached a higher level, let this be your motivation: you can do it again. Always use the trainings-phase, and analyze your precision of the pitch take over. Compare the take over with the test result. If you are not consistent, check if have you a tendency to be flat or sharp?

Variety and confidence

Once you have reached a certain level, try to vary the test. Instead of solfège syllables, hum or sing the notes using different vowels. Mastering other sounds adds flexibility and will increase your confidence.

Finding a music teacher

If you like music and want to express yourself on an instrument, it is recommended that you take lessons. In the beginning it is particularly important to be supervised with basic things like sitting comfortably, good posture, handling the instrument correctly, having a good sightline to the score, and relaxed execution. If you learn these things incorrectly, they can become big hindrances to making progress later when pieces get more difficult.

Practice times

As with learning another language, it is recommended that you practice in several short sessions rather than one long one. We also suggest taking a break every 15 minutes or so. Your experience will be enriched if you do an exercise in the morning, repeat it around mid-day, and then another time in the evening. You may find that your perceived recognition and performance, is different at various times of the day.

FAQ

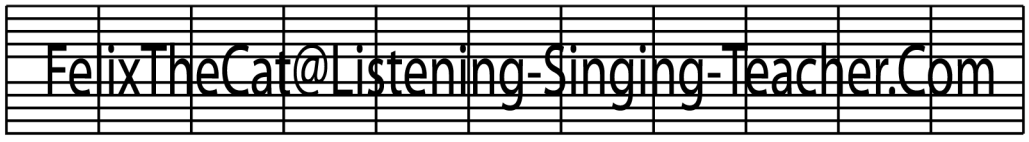
Where do I get support?

There is no telephone support hotline, but we are interested in improving the product. If you find errors or experience program crashes, let us know. Tell us also about documentation errors, sound errors, or any other suggestions for improvement of the program. If the program stops unexpectedly, see the system console log for error messages. If the problem can be documented by a recording, export the recording and send it along with an error description to the address given below.

Troubleshooting tips

Check to see if you can download a newer version with the same major version number. If so, back up your old version before installing the newer one and try reproducing the error.

If no pitch curve is displayed, check the sound control panel to see that the default input device is working correctly. If the input level is too low, increase it with the slider. If this does not work, you may have a microphone not suited for that input channel. Expensive microphones often need special pre-amplifiers. The input channel must support microphones; line-in input channels require a higher voltage signal than what is provided from standard microphones. There may also be a separate control panel for your digitizing device to adjust the sensitivity; check your hardware manuals. If you hear a lot of background noise, make sure nothing else is disturbing the audibility. If there are clicks, chirps or audible hissing, you might have unshielded microphone cables picking up electro-smog, or the microphone itself picking up a grumble from the 50/60 Hz power outlets. Try to reposition the microphone/cables. Make sure that the volume level display is in the correct range. If it is quiet the sound control panel should show zero input-level indicator lights (otherwise some electrical interferences are around).

Send all the information (e.g. Computer Model, RAM, graphic card, audio equipment) that might be helpful in resolving the problem to:

Can I print the statistics?

Unfortunately, this version does not contain a print feature. You must make hardcopies of the windows by pressing the Print button. (For Macs, use the application grab from the utilities folder—or press Command-Shift-3.)

Why the elaborate licensing terms? Is the use of software all at my sole risk?

In today's world, where everybody can sue everybody for everything, one has to be cautious. If you are a super soprano and can break glassware just by singing, please do not blame Listening Singing Teacher for your destroyed property; we will not pay for it in such circumstances. Even worse, if you are a bass who could destroy Jericho (Jericho was brought down by sound-waves, according to the Bible). Hopefully you do not live in New York City…

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Do I have to be online to use the software?

No. You only have to be online to download the software and activate the serial number.

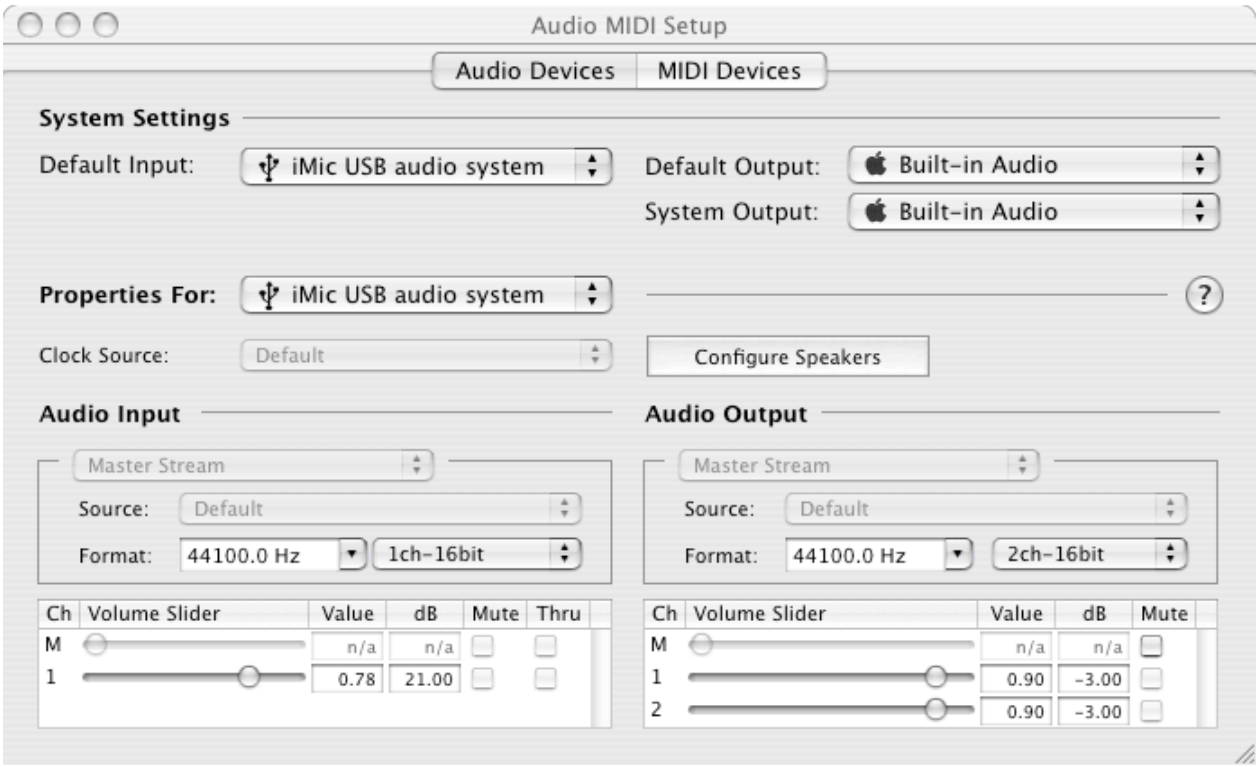
No sound for low notes

If you set the instrument to "Sinus," you need a good headset to hear the low notes. Mediocre loudspeakers can have difficulty reproducing frequencies below A2 (110 Hz). The Flute option has more overtones and thus will be easier to hear.

Microphone Input level too low, distortion or audio device not supported (Macintosh)

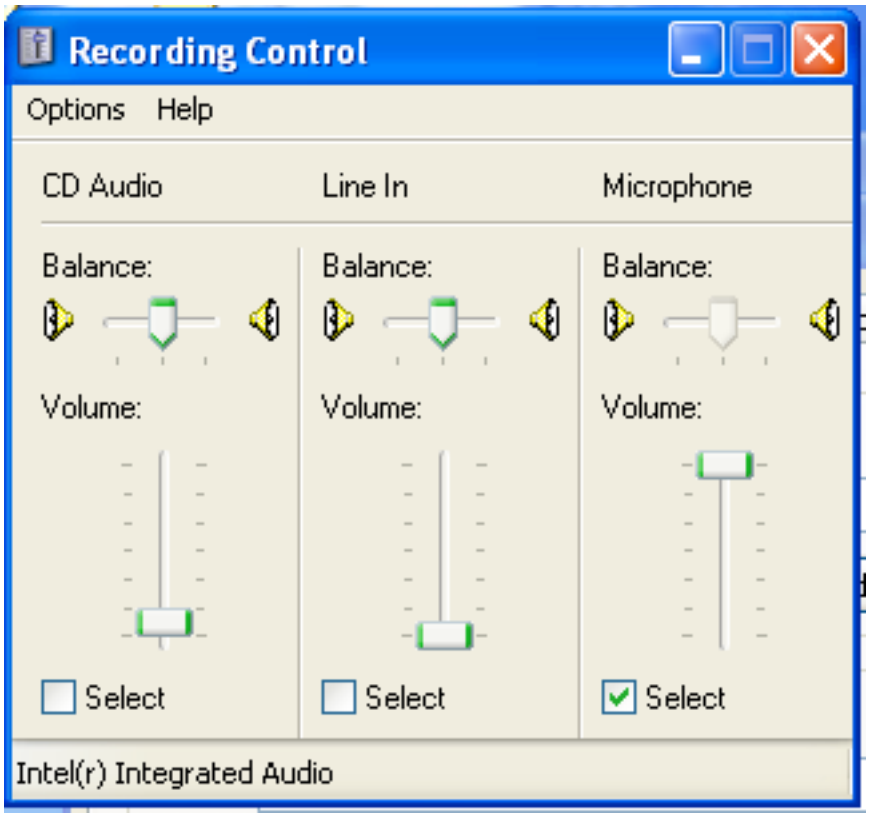
In the applications Utility Folder open "Audio Midi Setup," and Select the "Audio Devices" tab. From the "Default Input" drop-down Menu choose your microphone and in the "Properties For" also choose your microphone (see below). Drag the slider on the bottom of "Audio Input" to the right. Also make sure that the selected format is 44100.0 HZ and one channel 16 Bit (1ch-16 Bit).

Other audio applications (e.g. GarageBand) may reset the input level, the frequency, or the 16-Bit setting to 8 Bit. Be sure to check and set the following settings correctly:



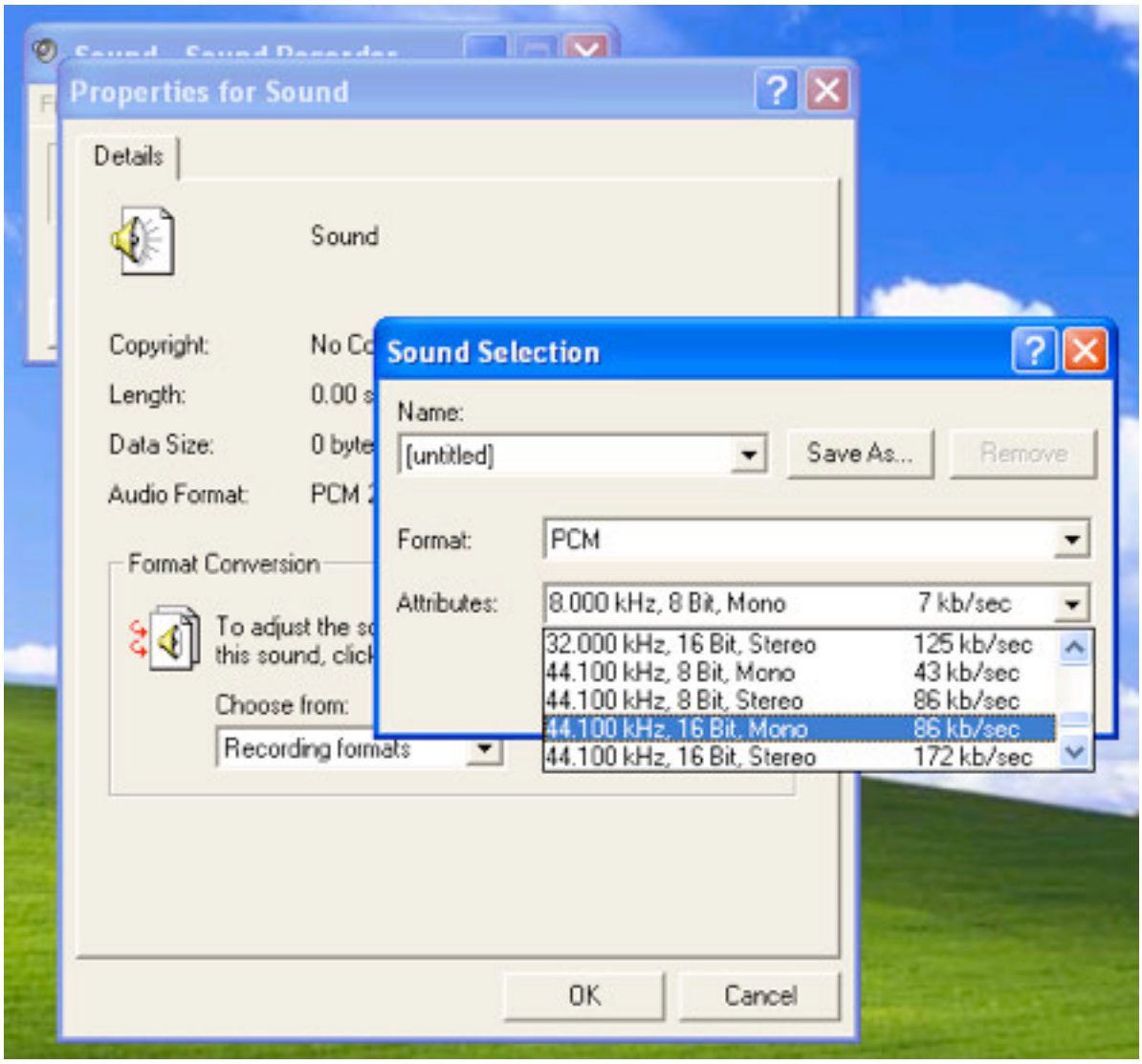
Microphone Input level too low, distortion or audio device not supported (Windows)

In the control panel choose “Sounds and Audio Devices.” Click on the Audio tab. Under Sound recording set the volume for the microphone to the maximum.



Also make sure that the Format is set to 44.100 kHz and 16 Bit Mono. Make a Test Recording with the “Sound Recorder” (Click on “Start” —> “All Programs” —> “Accessories” —> “Entertainment” —> “Sound Recorder”).

In the Sound Recorder, under the “File” menu, click on “Properties.” Under “Choose from” select “Recording formats” and click “Convert Now.” Set the Format to PCM and select “44.100 kHz 16 Bit, Mono.”


Properties for Sound
Details
Sound
Copyright:
Length:
Data Size:
Audio Format:
Format Conversion
Choose from:
Recording formats
OK
Cancel
Sound Selection
Name:
[untitled]
Save As...
Remove
Format:
PCM
Attributes:
8.000 kHz, 8 Bit, Mono 7 kb/sec
32.000 kHz, 16 Bit, Stereo 125 kb/sec
44.100 kHz, 8 Bit, Mono 43 kb/sec
44.100 kHz, 8 Bit, Stereo 86 kb/sec
44.100 kHz, 16 Bit, Mono 86 kb/sec
44.100 kHz, 16 Bit, Stereo 172 kb/sec

Registration

There is no registration necessary for the Pitch Ability Test program.

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2. OpenAL on Windows

During the Installation you will be asked to accept the licence terms of Openal.

3. Glut32.dll (Windows only)

Glut32.dll is under LGPL (GNU Lesser General Public License):

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                     Version 3, 29 June 2007

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