

Manual for the experimental version of OptiKey

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Introduction

This is a manual for the [experimental version of OptiKey](#) developed by the Danish research project [GazelT](#). This project aims to be an easy solution for a person who wants to conduct gaze typing experiments using [OptiKey](#).

This project is developed on top of OptiKey's code base, and is essentially a modified version of OptiKey with an added option to manipulate settings for the experiment before doing the experiment with OptiKey. While conducting gaze typing experiments the program will log gaze data together with program data from OptiKey (such as which keys are being looked at in real time) into CSV files for later analysis.

This manual will explain how to get the experimental version of OptiKey downloaded and running ([Section 1.1](#)) (recommended if you don't have experience with Git and Visual Studio), or alternatively, one can clone the repository, build the project, and run it through Visual Studio ([Section 1.2](#)) (recommended if you do have experience with Git and Visual Studio).

This manual will also give a tour of the program to show it's features ([Section 2](#)). Lastly it will go through and explain the output files ([Section 3](#)).

Prerequisites

This experimental version of OptiKey will only work on computers and tablets running the Windows operating system (Windows Vista SP2, 7, 8, 8.1 and Windows 10).

The computer or tablet should be decent, however high performance equipment is not required.

As of November 9, 2017, the Gaze data logging feature only works with the [EyeTribe developer kit](#). More Gaze trackers are to be added in the future.

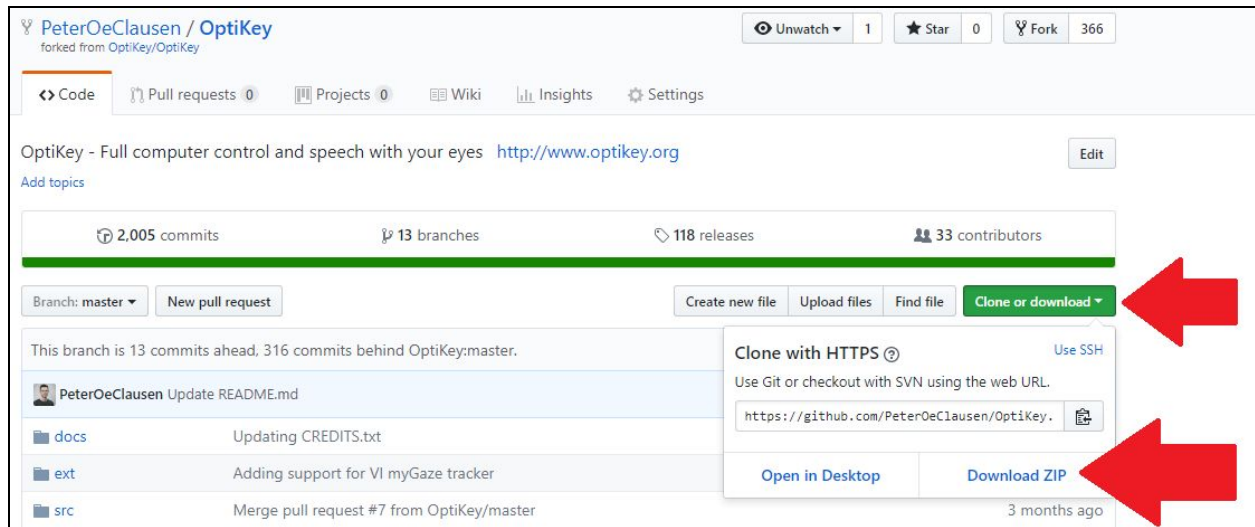
1.1: How to get the program as a zip and run it

In this section we will explain how you can download the program as a zip file with Windows 10 (Note that a similar process can be done with previous versions of Windows). Note also that by doing it this way, you have to get a new version manually if a new one comes out. We recommend doing this if you are not familiar with Visual Studio and Git. However if you are

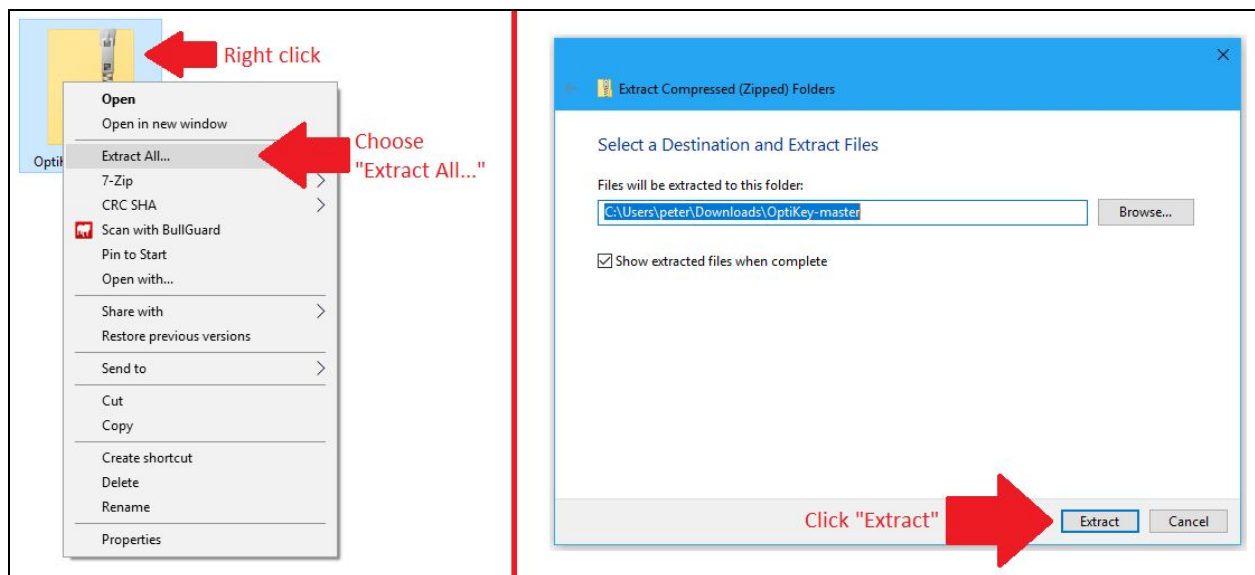
familiar with Visual Studio and Git, you should consider doing [section 1.2](#) instead, since you more easily can update the program to the newest version.

Let's get started:

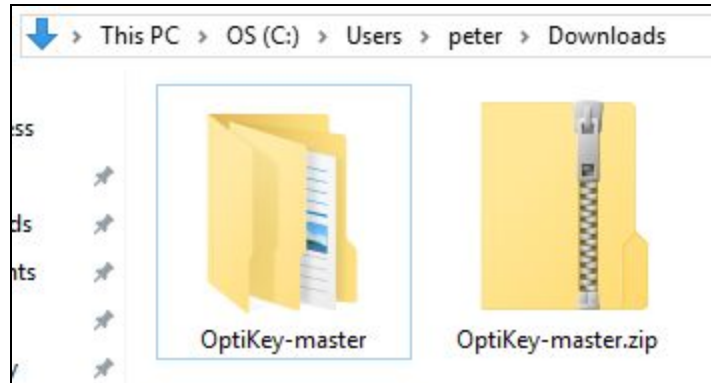
- 1) Go to the github page for the project: <https://github.com/PeterOeClausen/OptiKey>
- 2) Click on the green "Clone or download" button, and then click "Download ZIP" as shown in the image below:



- 3) Go to the location on your computer where you just downloaded the Zip file to, and unzip it by right-clicking the file and pressing "Extract all..." and then "Extract" as shown in the image below:



- 4) You should now have an unzipped folder right next to ".zip" file we downloaded, or the location you specified in the extraction program:



- 5) Optional: You can now delete “OptiKey-master.zip” file, we won't be using it any longer.
- 6) Open the “OptiKey-master” folder, inside it, there should be another “OptiKey-master” folder, open that as well. You are now in the root directory of the project. Note: If you have Visual Studio installed, you can open the “OptiKey.sln” file, and get access to all the code, and run it with Visual Studio. If you do not have Visual Studio installed, do the following step.
- 7) Inside this folder there should be a zip file called “Build-” followed by some numbers. These numbers indicates the year, month and date the program was generated from code files. Example: “Build-20171109” would be a program generated the 9th of November, 2017. A newer version may have bug fixes or more features than older versions. Unzip this by right-clicking and selecting “Extract All...”, and then “Extract” as we did before. Inside the folder generated, you can start the program by double clicking “OptiKey.exe”:

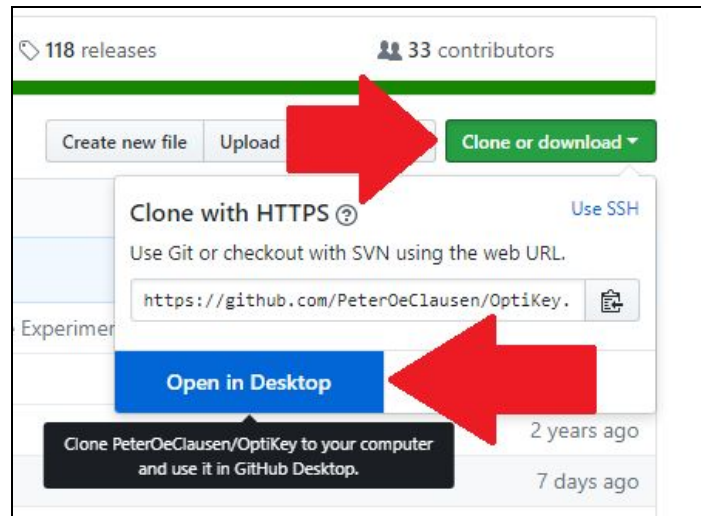
Octokit.pdb	07-Oct-16 13:01	Program Debug D...	1,920 KB
Octokit.xml	07-Oct-16 13:01	XML Document	1,507 KB
OptiKey.exe	09-Nov-17 13:13	Application	10,215 KB
OptiKey.exe.config	12-Oct-17 15:34	XML Configuratio...	47 KB
OptiKey.pdb	09-Nov-17 13:13	Program Debug D...	1,698 KB



You can now proceed to [section 2](#) to read through a tour of the program.

1.2: How to get the code through git and run it with Visual Studio

- 1) Clone the repository found here: <https://github.com/PeterOeClausen/OptiKey>
 - a) This can either be done with a command shell like CMD or Bash. If you have Git installed, navigate to the folder with “cd your/folder/name/here” where you want to put the project and write:
“git clone <https://github.com/PeterOeClausen/OptiKey>”.
 - b) Alternatively, if one has the [Github for Windows](#) desktop program installed, one can click “Open in Desktop” on the [project's Github page](#), to clone the project:

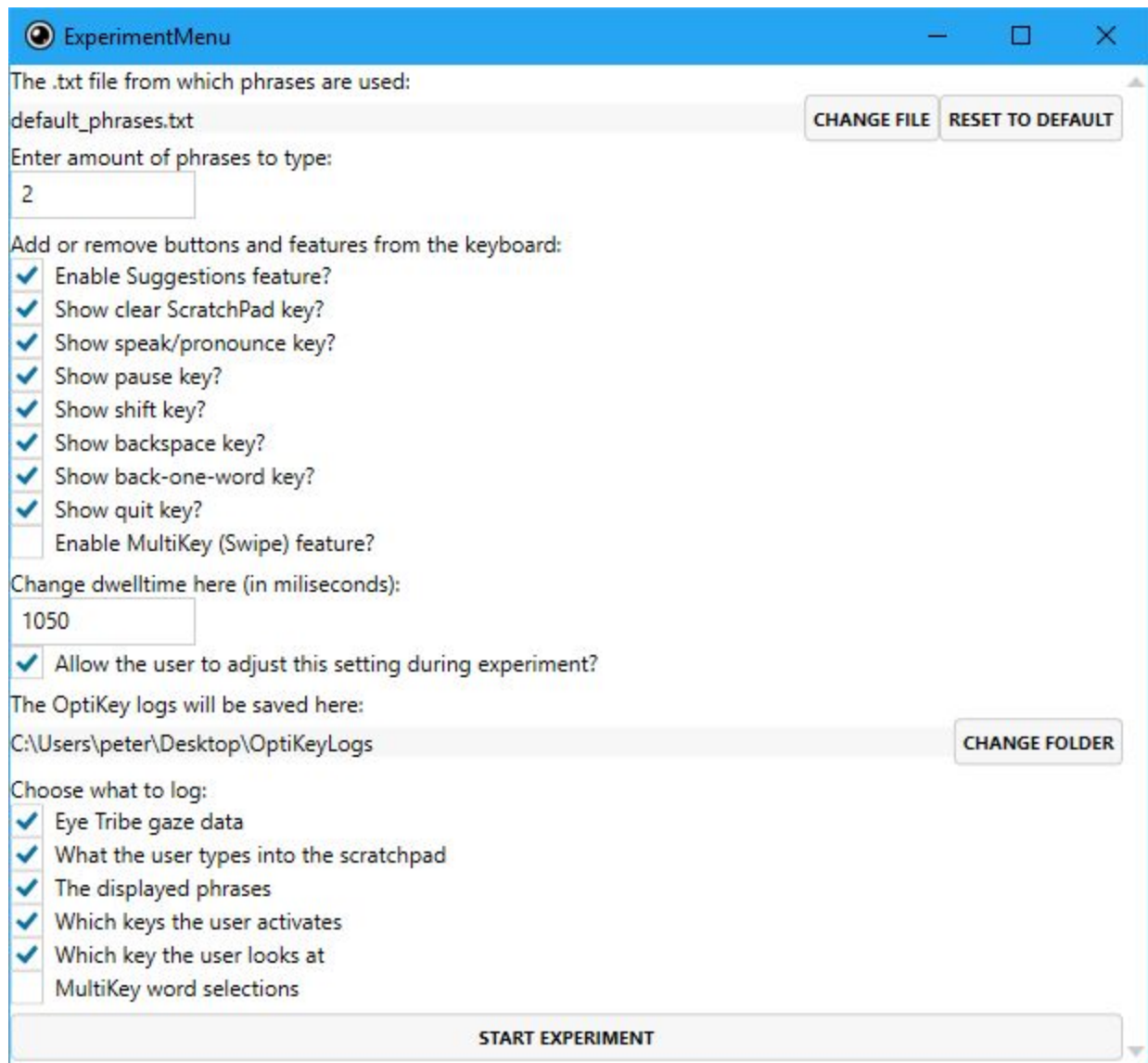


- 2) Open the OptiKey.sln file in Visual Studio.
- 3) Press "run".
- 4) You can update the program from a command shell like CMD or Bash by writing "git pull". Or alternatively one can do it from the Github for Windows desktop program.

2: Tour of the program

The program consists of two windows, the “Experiment Menu window” which can be seen below and the “keyboard” window which can be seen below the Experiment Menu window.

The Experiment Menu is the first window you will see when you startup the program. From here, you can set the settings from your experiment:



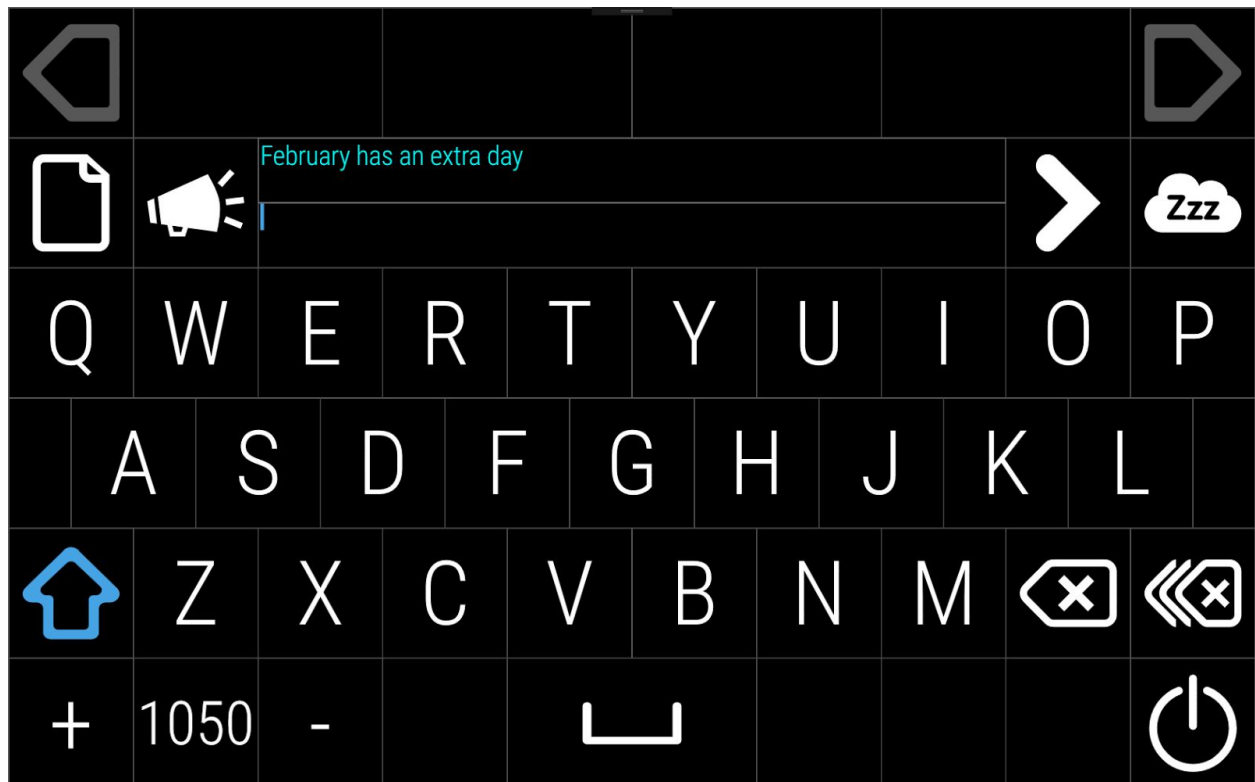
The screenshot shows the "ExperimentMenu" window with a blue title bar. The window contains several settings sections:

- The .txt file from which phrases are used:** A text field showing "default_phrases.txt" with "CHANGE FILE" and "RESET TO DEFAULT" buttons to its right.
- Enter amount of phrases to type:** A text field containing the number "2".
- Add or remove buttons and features from the keyboard:** A list of checkboxes:
 - ☒ Enable Suggestions feature?
 - ☒ Show clear ScratchPad key?
 - ☒ Show speak/pronounce key?
 - ☒ Show pause key?
 - ☒ Show shift key?
 - ☒ Show backspace key?
 - ☒ Show back-one-word key?
 - ☒ Show quit key?
 - ☐ Enable MultiKey (Swipe) feature?
- Change dwelltime here (in milliseconds):** A text field containing "1050".
- ☒ Allow the user to adjust this setting during experiment?
- The OptiKey logs will be saved here:** A text field showing "C:\Users\peter\Desktop\OptiKeyLogs" with a "CHANGE FOLDER" button to its right.
- Choose what to log:** A list of checkboxes:
 - ☒ Eye Tribe gaze data
 - ☒ What the user types into the scratchpad
 - ☒ The displayed phrases
 - ☒ Which keys the user activates
 - ☒ Which key the user looks at
 - ☐ MultiKey word selections
- START EXPERIMENT** button at the bottom.

Note that the program saves your settings, so that you can easily run multiple experiments with the same parameters.

When you are done setting the settings, click the button in the bottom that says “START EXPERIMENT”.

The program will then start the experiment with the keyboard based on your settings:



You can now conduct the experiment, while the program logs your activity.
You can take a look at what the output files contains in the next section.

3: Produced output

The produced output files are saved in the folder specified in the experiment menu. On the previous picture of the experiment menu it says: “The OptiKey logs will be saved here:”
“C:\Users\peter\Desktop\OptiKeyLogs”.

By default, the experimental version of OptiKey saves the data logged in csv files in the folder called ‘OptiKeyLogs’ located at the desktop. Note that the location of the ‘OptiKeyLogs’ folder can be configured by you in the ExperimentMenu.

Inside the OptiKeyLogs folder, after conducting an experiment, there will be a folder with a timestamp, eg. “2018-1-10-13-16-39”, which indicates “year-month-day-hour-minute-second” that the experiment started, and contains the logs produced in the experiment started at that time.

There are 6 different logs available:

1. PhraseLog.csv - Contains which phrases are shown for the user (the cyan text in the previous image).

2. KeySelectionLog.csv - Contains which keys the user activates during the experiment.
3. ScratchPadLog.csv - Contains what characters are in the ScratchPad area (blue text in the previous image), and is updated every time a new character is added to the scratchpad.
4. User_looks_at_key_log.csv - Contains what keyboard keys and areas the user looks at during the experiment. This is updated every 5-30 milliseconds.
5. multiKeySelectionLog.csv - Contains the interpreted sentences generated when the user is using the multiKeySwipe feature.
6. GazeLog.csv - Contains the gaze tracking information produced during the experiment.

I will now show some excerpts of the log files:

PhraseLog.csv:

```
systemTimeStamp,phraseText
2018-1-10-13-19-2-932,elephants are afraid of mice
2018-1-10-13-20-17-510,the protesters blocked all traffic
```

KeySelectionLog.csv:

```
systemTimeStamp,keySelected
2018-1-10-13-19-6-957,e
2018-1-10-13-19-9-660,l
2018-1-10-13-19-12-518,e
2018-1-10-13-19-15-175,p
2018-1-10-13-19-17-112,h
2018-1-10-13-19-19-49,a
2018-1-10-13-19-22-50,n
2018-1-10-13-19-24-441,t
2018-1-10-13-19-27-331,s
2018-1-10-13-19-30-534,SpaceBar
2018-1-10-13-19-33-569,a
2018-1-10-13-19-35-476,r
2018-1-10-13-19-37-364,e
... the rest is omitted for brevity.
```

ScratchPadLog.csv:

```
systemTimeStamp,scratchPadText
2018-1-10-13-19-7-52,E
2018-1-10-13-19-9-667,El
2018-1-10-13-19-12-524,Ele
2018-1-10-13-19-15-182,Ellep
2018-1-10-13-19-17-119,Eleph
2018-1-10-13-19-19-55,Elepha
2018-1-10-13-19-22-56,Elephan
```

2018-1-10-13-19-24-448, Elephant
 2018-1-10-13-19-27-339, Elephants
 2018-1-10-13-19-30-541, Elephants
 2018-1-10-13-19-33-577, Elephants a
 2018-1-10-13-19-35-484, Elephants ar
 2018-1-10-13-19-37-372, Elephants are
 2018-1-10-13-19-40-76, Elephants are
 2018-1-10-13-19-43-909, Elephants are a
 2018-1-10-13-19-46-906, Elephants are af
 2018-1-10-13-19-49-57, Elephants are afr
 2018-1-10-13-19-50-963, Elephants are afra
 2018-1-10-13-19-52-855, Elephants are afrai
 2018-1-10-13-19-55-386, Elephants are afraid
 2018-1-10-13-19-59-533, Elephants are afraid
 2018-1-10-13-20-1-418, Elephants are afraid o
 2018-1-10-13-20-3-649, Elephants are afraid of
 2018-1-10-13-20-5-509, Elephants are afraid of
 2018-1-10-13-20-7-451, Elephants are afraid of m
 2018-1-10-13-20-9-309, Elephants are afraid of mi
 2018-1-10-13-20-11-135, Elephants are afraid of mic
 2018-1-10-13-20-13-133, Elephants are afraid of mice
 ... the rest i omitted for brevity.

User_looks_at_key_log.csv:

systemTimeStamp, key, progressInPercent
 2018-1-10-13-19-4-362, PhraseTextBlock, 0.0264
 2018-1-10-13-19-4-386, PhraseTextBlock, 0.0528
 2018-1-10-13-19-4-416, PhraseTextBlock, 0.08
 2018-1-10-13-19-4-449, PhraseTextBlock, 0.1064
 2018-1-10-13-19-4-480, PhraseTextBlock, 0.1336
 2018-1-10-13-19-4-511, PhraseTextBlock, 0.16
 2018-1-10-13-19-4-546, PhraseTextBlock, 0.1864
 2018-1-10-13-19-4-589, PhraseTextBlock, 0.2128
 2018-1-10-13-19-4-621, PhraseTextBlock, 0.2392
 2018-1-10-13-19-4-652, PhraseTextBlock, 0.2664
 2018-1-10-13-19-4-683, PhraseTextBlock, 0.2928
 2018-1-10-13-19-4-714, PhraseTextBlock, 0.3192
 2018-1-10-13-19-4-744, PhraseTextBlock, 0.3456
 2018-1-10-13-19-4-776, PhraseTextBlock, 0.3728
 2018-1-10-13-19-4-807, PhraseTextBlock, 0.3992
 2018-1-10-13-19-4-856, PhraseTextBlock, 0.4256
 2018-1-10-13-19-4-885, PhraseTextBlock, 0.4528
 2018-1-10-13-19-4-917, PhraseTextBlock, 0.48

2018-1-10-13-19-4-949,PhraseTextBlock,0.5064
2018-1-10-13-19-4-979,PhraseTextBlock,0.5328
2018-1-10-13-19-5-11,PhraseTextBlock,0.5592
2018-1-10-13-19-5-42,PhraseTextBlock,0.5864
2018-1-10-13-19-5-714,e,0.0264
2018-1-10-13-19-5-744,e,0.0528
2018-1-10-13-19-5-777,e,0.0792
2018-1-10-13-19-5-808,e,0.1056
2018-1-10-13-19-5-846,PhraseTextBlock,0
2018-1-10-13-19-5-854,e,0.1328
2018-1-10-13-19-5-885,e,0.1592
2018-1-10-13-19-5-916,e,0.1856
2018-1-10-13-19-5-950,e,0.212
2018-1-10-13-19-5-979,e,0.2392
2018-1-10-13-19-6-12,e,0.2656
2018-1-10-13-19-6-42,e,0.2928
2018-1-10-13-19-6-90,e,0.32
2018-1-10-13-19-6-120,e,0.3464
2018-1-10-13-19-6-151,e,0.3728
2018-1-10-13-19-6-183,e,0.3992
2018-1-10-13-19-6-214,e,0.4264
2018-1-10-13-19-6-245,e,0.4528
2018-1-10-13-19-6-276,e,0.4792
2018-1-10-13-19-6-308,e,0.5056
2018-1-10-13-19-6-354,e,0.5328
2018-1-10-13-19-6-386,e,0.5592
2018-1-10-13-19-6-417,e,0.5856
2018-1-10-13-19-6-448,e,0.6128
2018-1-10-13-19-6-479,e,0.6392
2018-1-10-13-19-6-511,e,0.6656
2018-1-10-13-19-6-542,e,0.6928
2018-1-10-13-19-6-573,e,0.7192
2018-1-10-13-19-6-620,e,0.7456
2018-1-10-13-19-6-651,e,0.772
2018-1-10-13-19-6-683,e,0.7992
2018-1-10-13-19-6-713,e,0.8256
2018-1-10-13-19-6-744,e,0.852
2018-1-10-13-19-6-776,e,0.8792
2018-1-10-13-19-6-807,e,0.9056
2018-1-10-13-19-6-839,e,0.932
2018-1-10-13-19-6-886,e,0.9592
2018-1-10-13-19-6-917,e,0.9856
2018-1-10-13-19-6-949,e,1

2018-1-10-13-19-7-277,e,0.0272
2018-1-10-13-19-7-308,e,0.0536
2018-1-10-13-19-7-355,e,0.08
2018-1-10-13-19-7-386,e,0.1064
2018-1-10-13-19-7-418,e,0.1336
2018-1-10-13-19-7-776,k,0.0264
2018-1-10-13-19-7-807,k,0.0528
2018-1-10-13-19-7-840,k,0.08
2018-1-10-13-19-7-886,k,0.1064
2018-1-10-13-19-7-917,k,0.1328
2018-1-10-13-19-7-948,k,0.16
2018-1-10-13-19-7-979,k,0.1864
2018-1-10-13-19-8-11,k,0.2128
2018-1-10-13-19-8-42,k,0.2392
2018-1-10-13-19-8-199,e,0
2018-1-10-13-19-8-417,l,0.0264
2018-1-10-13-19-8-448,l,0.0536
2018-1-10-13-19-8-479,l,0.08
2018-1-10-13-19-8-511,l,0.1064
2018-1-10-13-19-8-543,l,0.1336
2018-1-10-13-19-8-573,l,0.16
2018-1-10-13-19-8-605,l,0.1872
2018-1-10-13-19-8-652,l,0.2136
2018-1-10-13-19-8-683,l,0.24
2018-1-10-13-19-8-714,l,0.2672
2018-1-10-13-19-8-745,l,0.2936
2018-1-10-13-19-8-776,l,0.32
2018-1-10-13-19-8-808,l,0.3464
2018-1-10-13-19-8-824,k,0
2018-1-10-13-19-8-840,l,0.3736
2018-1-10-13-19-8-871,l,0.4
2018-1-10-13-19-8-917,l,0.4264
2018-1-10-13-19-8-948,l,0.4536
2018-1-10-13-19-8-980,l,0.48
2018-1-10-13-19-9-12,l,0.5064
2018-1-10-13-19-9-42,l,0.5328
2018-1-10-13-19-9-74,l,0.56
2018-1-10-13-19-9-105,l,0.5864
2018-1-10-13-19-9-151,l,0.6136
2018-1-10-13-19-9-184,l,0.64
2018-1-10-13-19-9-215,l,0.6664
2018-1-10-13-19-9-246,l,0.6928
2018-1-10-13-19-9-276,l,0.72

2018-1-10-13-19-9-308,1,0.7464
2018-1-10-13-19-9-339,1,0.7728
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2018-1-10-13-19-9-417,1,0.8264
2018-1-10-13-19-9-449,1,0.8528
2018-1-10-13-19-9-480,1,0.88
2018-1-10-13-19-9-511,1,0.9064
2018-1-10-13-19-9-542,1,0.9328
2018-1-10-13-19-9-573,1,0.96
2018-1-10-13-19-9-605,1,0.9864
2018-1-10-13-19-9-651,1,1
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2018-1-10-13-19-10-449,e,0.16
2018-1-10-13-19-10-480,e,0.1864
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2018-1-10-13-19-10-652,e,0.3192
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2018-1-10-13-19-10-777,e,0.4264
2018-1-10-13-19-10-808,e,0.4528
2018-1-10-13-19-10-839,e,0.4792
2018-1-10-13-19-10-870,e,0.5056
2018-1-10-13-19-10-917,e,0.5328
2018-1-10-13-19-10-948,e,0.5592
2018-1-10-13-19-10-979,e,0.5856
2018-1-10-13-19-11-11,e,0.6128
2018-1-10-13-19-11-42,e,0.6392
2018-1-10-13-19-11-73,e,0.6656
2018-1-10-13-19-11-481,e,0.6656
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2018-1-10-13-19-11-871,s,0.0536
2018-1-10-13-19-11-902,s,0.08
2018-1-10-13-19-11-949,s,0.1064
2018-1-10-13-19-11-980,s,0.1336
2018-1-10-13-19-12-11,s,0.16

2018-1-10-13-19-12-73,e,0.6656
2018-1-10-13-19-12-104,e,0.6928
2018-1-10-13-19-12-136,e,0.7192
2018-1-10-13-19-12-183,e,0.7464
2018-1-10-13-19-12-215,e,0.7728
2018-1-10-13-19-12-245,e,0.7992
2018-1-10-13-19-12-277,e,0.8256
2018-1-10-13-19-12-309,e,0.8528
2018-1-10-13-19-12-339,e,0.8792
2018-1-10-13-19-12-370,e,0.9056
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2018-1-10-13-19-12-448,e,0.9592
2018-1-10-13-19-12-479,e,0.9856
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2018-1-10-13-19-13-542,o,0.0536
2018-1-10-13-19-13-575,o,0.0808
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2018-1-10-13-19-13-980,p,0.0536
2018-1-10-13-19-14-11,p,0.08
2018-1-10-13-19-14-43,p,0.1064
2018-1-10-13-19-14-73,p,0.1336
2018-1-10-13-19-14-104,p,0.16
2018-1-10-13-19-14-137,p,0.1864
2018-1-10-13-19-14-167,p,0.2136
2018-1-10-13-19-14-214,p,0.24
2018-1-10-13-19-14-246,p,0.2672
2018-1-10-13-19-14-277,p,0.2936
2018-1-10-13-19-14-308,p,0.32
2018-1-10-13-19-14-339,p,0.3464
2018-1-10-13-19-14-355,o,0
2018-1-10-13-19-14-371,p,0.3736
2018-1-10-13-19-14-402,p,0.4
2018-1-10-13-19-14-448,p,0.4264
2018-1-10-13-19-14-480,p,0.4528
2018-1-10-13-19-14-511,p,0.48
2018-1-10-13-19-14-543,p,0.5064
2018-1-10-13-19-14-574,p,0.5336
2018-1-10-13-19-14-605,p,0.56
2018-1-10-13-19-14-636,p,0.5864
2018-1-10-13-19-14-667,p,0.6136

2018-1-10-13-19-14-715,p,0.64
2018-1-10-13-19-14-745,p,0.6664
2018-1-10-13-19-14-778,p,0.6928
2018-1-10-13-19-14-808,p,0.72
2018-1-10-13-19-14-839,p,0.7464
2018-1-10-13-19-14-870,p,0.7728
2018-1-10-13-19-14-902,p,0.8
2018-1-10-13-19-14-934,p,0.8264
2018-1-10-13-19-14-979,p,0.8528
2018-1-10-13-19-15-11,p,0.8792
2018-1-10-13-19-15-42,p,0.9064
2018-1-10-13-19-15-75,p,0.9328
2018-1-10-13-19-15-104,p,0.9592
2018-1-10-13-19-15-136,p,0.9864
2018-1-10-13-19-15-168,p,1
2018-1-10-13-19-15-511,p,0.0264
2018-1-10-13-19-15-870,h,0.0264
2018-1-10-13-19-15-902,h,0.0536
2018-1-10-13-19-15-932,h,0.08
2018-1-10-13-19-15-965,h,0.1064
2018-1-10-13-19-16-11,h,0.1328
2018-1-10-13-19-16-42,h,0.16
2018-1-10-13-19-16-73,h,0.1872
2018-1-10-13-19-16-104,h,0.2136
2018-1-10-13-19-16-137,h,0.24
2018-1-10-13-19-16-167,h,0.2664
2018-1-10-13-19-16-198,h,0.2928
2018-1-10-13-19-16-246,h,0.32
2018-1-10-13-19-16-277,h,0.3464
2018-1-10-13-19-16-294,p,0
2018-1-10-13-19-16-309,h,0.3736
2018-1-10-13-19-16-339,h,0.4
2018-1-10-13-19-16-370,h,0.4264
2018-1-10-13-19-16-401,h,0.4536
2018-1-10-13-19-16-433,h,0.48
2018-1-10-13-19-16-480,h,0.5064
2018-1-10-13-19-16-513,h,0.5328
2018-1-10-13-19-16-542,h,0.5592
2018-1-10-13-19-16-574,h,0.5864
2018-1-10-13-19-16-605,h,0.6128
2018-1-10-13-19-16-636,h,0.6392
2018-1-10-13-19-16-667,h,0.6664
... The rest is omitted for brevity.

multiKeySelectionLog.csv (from another experiment):

```
systemTimeStamp, key(s)
2018-1-10-13-44-59-167, I
2018-1-10-13-45-1-59, PhraseTextBlock
2018-1-10-13-45-7-309, can
2018-1-10-13-45-12-377, St
2018-1-10-13-45-15-753, BackMany
2018-1-10-13-45-24-84, still
2018-1-10-13-45-29-956, feel
2018-1-10-13-45-36-686, your
2018-1-10-13-45-47-999, presence
2018-1-10-13-45-49-753, ScratchPad
2018-1-10-13-45-51-920, NextPhrase
2018-1-10-13-45-54-786, Quit
2018-1-10-13-45-57-4, YesQuestionResult
2018-1-10-13-45-58-573, YesQuestionResult
```

[illegible]

If you have any questions regarding the project, please send an email to PeterOeClausen@gmail.com