EyeSimplify

User's Guide

1.0

This User's Guide was written by

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Itendended Reader:
Users with psychological and computational background
you have already used the programs Edf2Asc, Eyetrack,
Eyedoctor, Eyedry and Edprep. This user's guide will
give some minor explanations about the steps within
the whole analysis process, and have some information
about the output.

Feel free to contact the author for more information.
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The project's website:
http://www.cl.uni-heidelberg.de/~manke/bba.htm

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Content

1. General Information about the Program

EyeSimplify is a framework for processing eyetracking .edf files (recorded with the "Eyetrack 0.6.1" -Program) to an analysis textfile representing four standard eye movement measurements: First Fixation (FF), First Pass (FP) and Total Time (TT).

In numerical order: You can clean up the eyetracking files with "Eyedoctor", add your regions of interest to the stimulus-source eyetracking file (.script → .del), and run a standard eye movement analysis.

You can change your order of processing the files, but this would lead to some complications. So provided order is highly recommended.

If you are lost: Click on this ⬚Help⬚ button to get some help.

2. Installation

Please check the following requirements before you start to run the software.

System Requirements:
- OS: Microsoft Windows 2000/XP (should also run with Win 98/Win ME)
- ca. 155 MB of free disk space (including Python 2.4 with PMW 1.2 and the source code)

This program is only optimised for .edf files created by the Eyelink II appartus and experiments created with Eyetrack 0.6.1.

Installation from Python Source Code

Extract the EyeSimplify_source.tar.gz.

The Program runs with Python 24. Please install also Python Mega Widgets 1.2 as site-package.
You can found Python 24 at: http://www.python.org/download/releases/2.4.4/
And PMW at: http://sourceforge.net/projects/pmw/

You don't need to install other site packages, because the GUI is written with Tcl/Tk (Tkinter).

Run EyeSimplify.py and make sure that every other python modules and listed programs in the same working directory.

3. How to use the Program

The following sections will explain how to perform all steps of data processing with EyeSimplify.

3.1 Start

Click on the Help-Button to view the online help.
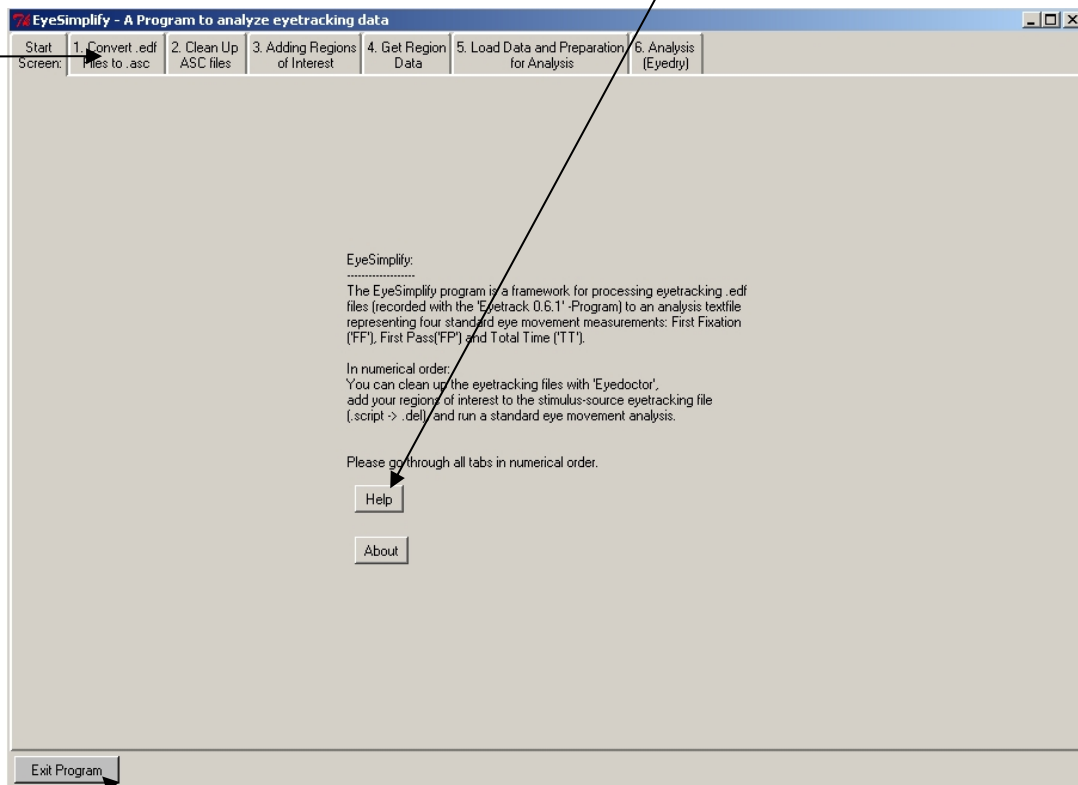
You can quit the application any time by clicking on the Exit Program – Button.

Go from one tab to another by clicking on it. Please go in a numerical order.

3.2 Converting .edf Files to .asc Files

Click on this tab to open the conversion- screen:
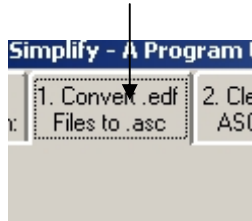
What it is:
A tool to convert binary .edf files to ascii files.

What it does:
Given an input file (.edf), it converts the file with the help of
the tool EDF2ASC (running in background), to an ascii file (.asc).

How to use it:
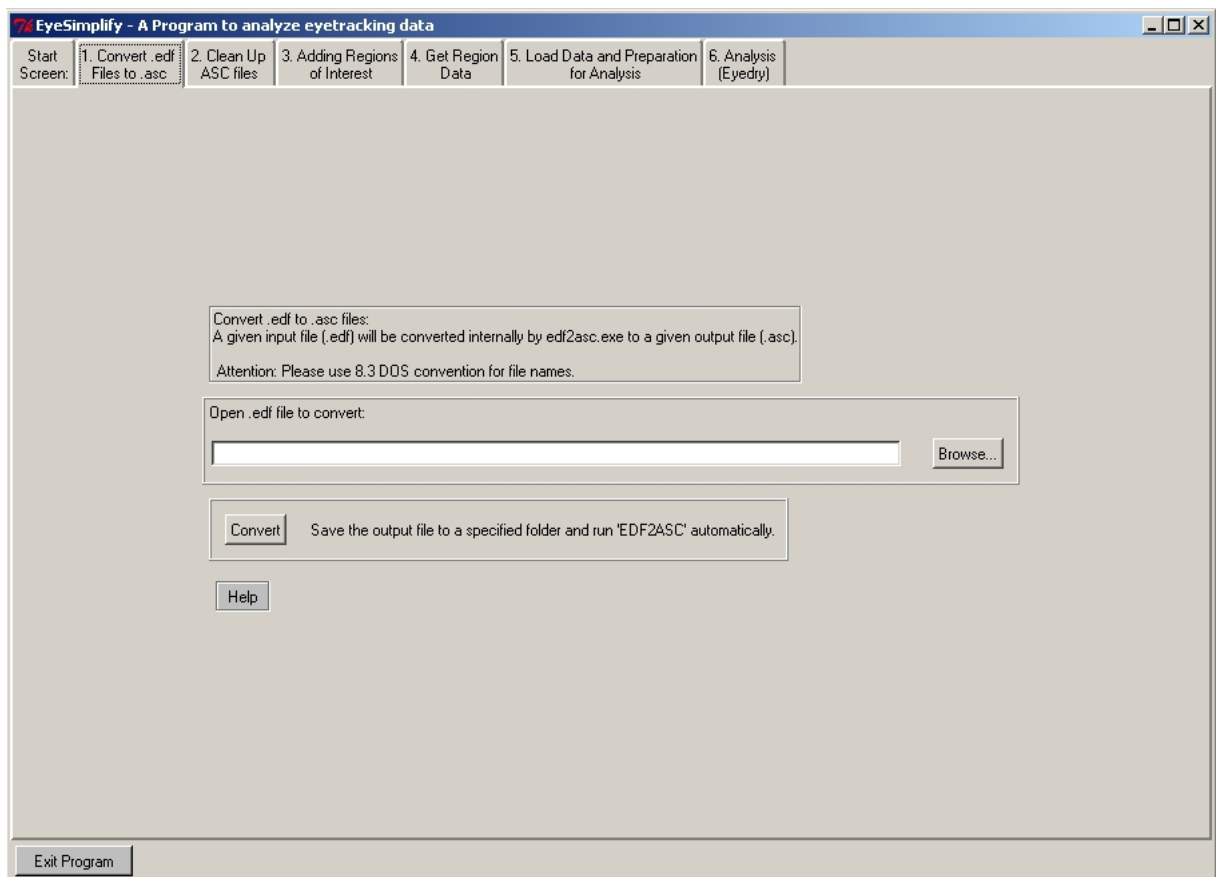
Be aware of to have each file named according to the DOS 8.3 convention.
It means, a filename consisting of 8 characters (no special char!) and
3 characters for filetype, e.g. 'myfile123.asc'

You can convert one file at a time.

You can also use the original EDF2ASC program and give it more files for processing or use the Windows version of EDF2ASC. Output comming from these programs can also be used with EyeSimplify.

1.Open an .edf file with the 'Browse file' - Button.
You will see the filename written in the text field.

2. Click on the 'Convert'-Button. You will be asked where to save the .asc file.

3. Tab 1, Step 1, finished.

3.3 Clean Up .asc Files:

Click on this tab to open the clean up- screen:
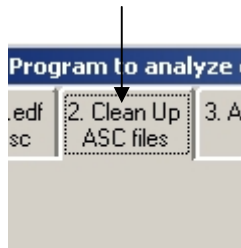
What it is:
A tool to view each trial and item for each subject's eye movement data.

What it does:
Import the .asc file and represents all fixations and saccades on a trial for a subject. Exports files to .da1 format.

How to use it:
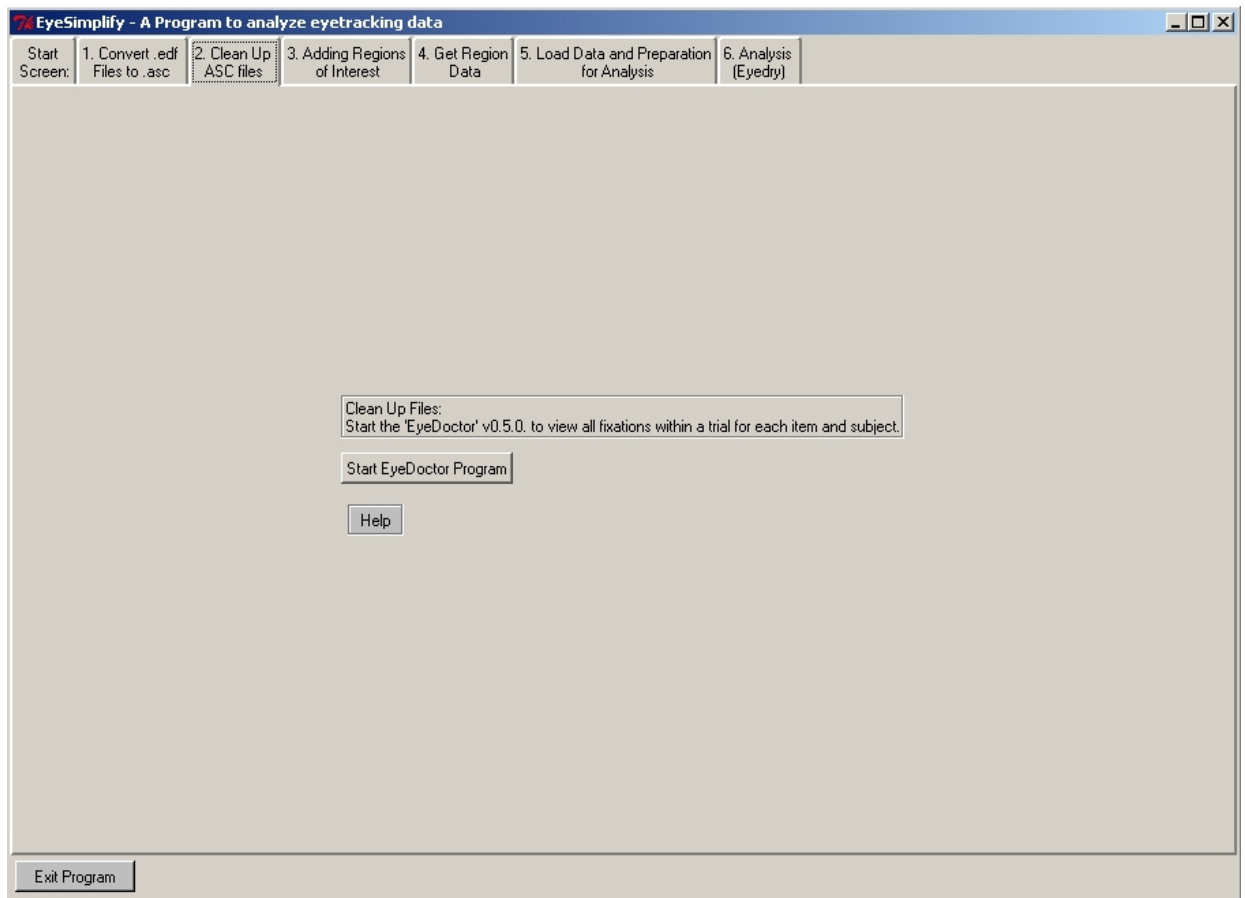
1. Open an .asc file to view it:

> 1.1 Click the button 'start Eyedoctor'. Now the Eyedoctor program should be open. If not, check, if the 'eyedoctor0.5.0.exe' is in the same folder where you started the program.
>
> 1.2 Go to the Eyedoctor program and look at the left side of the window. You'll see that you can change the size of the window with your mouse and therefore appearing some more options of Eyedoctor. Do that with the upper bottom line of the program.
>
> 1.3 Click on 'File', 'Import'.(Open is only for Eyedoctor created .edd files) You can now open your .asc file for viewing.
>
> 1.4 First of all: You cannot undo changes! So be aware of what you do. Change fixations by clicking on a fixation and changing the values on the left side of the program window, with the arrow keys.
>
> *Further information about the usage of Eyedoctor can be found in the corresponding documentation folder.*

2. Export a cleaned up file:

2.1 Click on 'File', 'Export', 'Eyedry Data'. Now you'll see a short window, where you can make some changes, which fixations should be merged together. You can take given default values.

2.2. Now you'll be asked where to store the file. Store it somewhere you want as .da1 file. (This is convention)

3. Close the Eyedoctor program.

You finished Tab 2, Step 2.

3.4 Adding Regions of Interest:

Click on this tab to open the editor- screen:

What it is:
It is an editor to edit a text file written by the experimental software EyeTrack 0.6.1.

What it does:
Opens a .script file (or an already delimited file .del), and and let the user insert a delimiter character (e.g. '^' or '§') to mark a region of interest.

You can also use another text editor, if you like. But please save the files as .del files. This is important for the next steps.

How to use it:
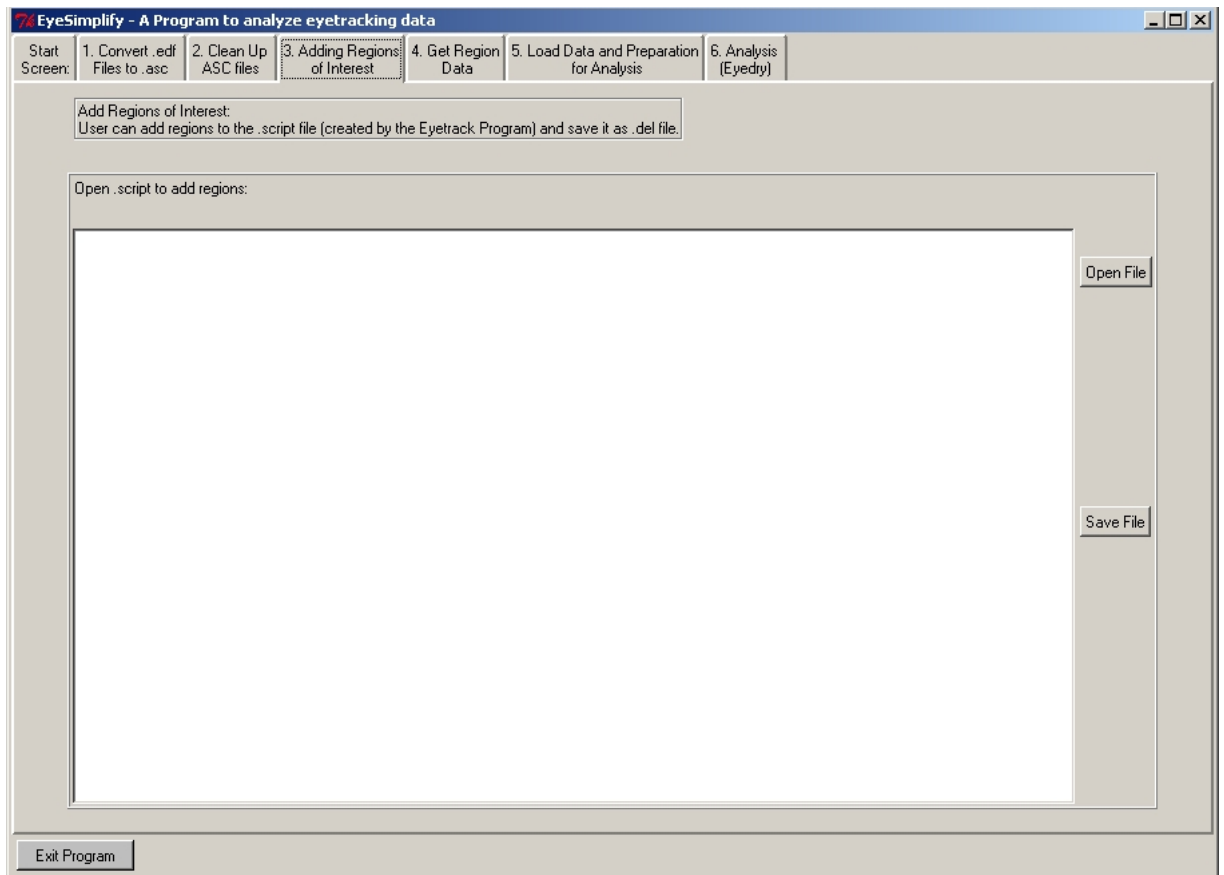
Add a Delimiter Character to the .script File:

      1. Open the .script file which you used for your experiment,
      by clicking on the 'Open File' - Button. Your .script file will now appear.

```
EyeSimplify - A Program to analyze eyetracking data                                          _ | □ | X |
┌──────┬─────────────┬─────────────┬─────────────────┬────────────┬──────────────────────────┬─────────────┐
│ Start │ 1. Convert .edf│ 2. Clean Up │ 3. Adding Regions│ 4. Get Region│ 5. Load Data and Preparation│ 6. Analysis │
│ Screen:│  Files to .asc │  ASC files  │   of Interest   │    Data     │        for Analysis        │  (Eyedry)   │
└──────┴─────────────┴─────────────┴─────────────────┴────────────┴──────────────────────────┴─────────────┘

 ┌─────────────────────────────────────────────────────────────────────────────────────┐
 │ Add Regions of Interest:                                                              │
 │ User can add regions to the .script file (created by the Eyetrack Program) and save it as .del file. │
 └─────────────────────────────────────────────────────────────────────────────────────┘

 ┌─ Open .script to add regions: ───────────────────────────────────────────────────────┐
 │                                                                              ▲         │
 │    inline =            |Sind diese Menschen bekannt als\nleidenscha           ┌──────┐│
 │ end P1I2D1                                                                    │Open File││
 │                                                                               └──────┘│
 │ trial P1I3D0                                                                           │
 │    trial_type =       Satz                                                             │
 │    max_display_time = 65000                                                            │
 │    inline =            |Viele Osteuropäer hatten mit Besorgnis\nder                    │
 │ end P1I3D0                                                                             │
 │                                                                                        │
 │ trial P1I4D0                                                                           │
 │    trial_type =       Satz                                                    ┌──────┐│
 │    max_display_time = 65000                                                   │Save File││
 │    inline =            |In der Antike hatten Griechen keinen einhe:            └──────┘│
 │ end P1I4D0                                                                             │
 │                                                                                        │
 │ trial P1I4D1                                                                           │
 │    trial_type =       Frage                                                            │
 │    max_display_time = 65000                                                            │
 │    button =           blue                                                   ▼         │
 │ ◄                                                                          ►           │
 └────────────────────────────────────────────────────────────────────────────────────┘

 ┌──────────┐
 │ Exit Program │
 └──────────┘
```

Example: An open .script file. Add your delimiter character within
        the lines beginning with "inline".

2. Add a delimiter char (a special character, that is NOT used the .script
file) to specify a region of interest (= which part of the sentence is
interesting for the later analysis).

3. Save the file by clicking on the 'Save' -Button. Be aware to do save it
as .del file.

4. You can re-open the file by clicking again on the 'Open'-Button.

5. Now you finished tab 3, step 3.

3.5 Get Region Data:

Click on this tab to open the screen:

What it is:
EDPREP is a tool to convert the marked regions of interest in the .del file
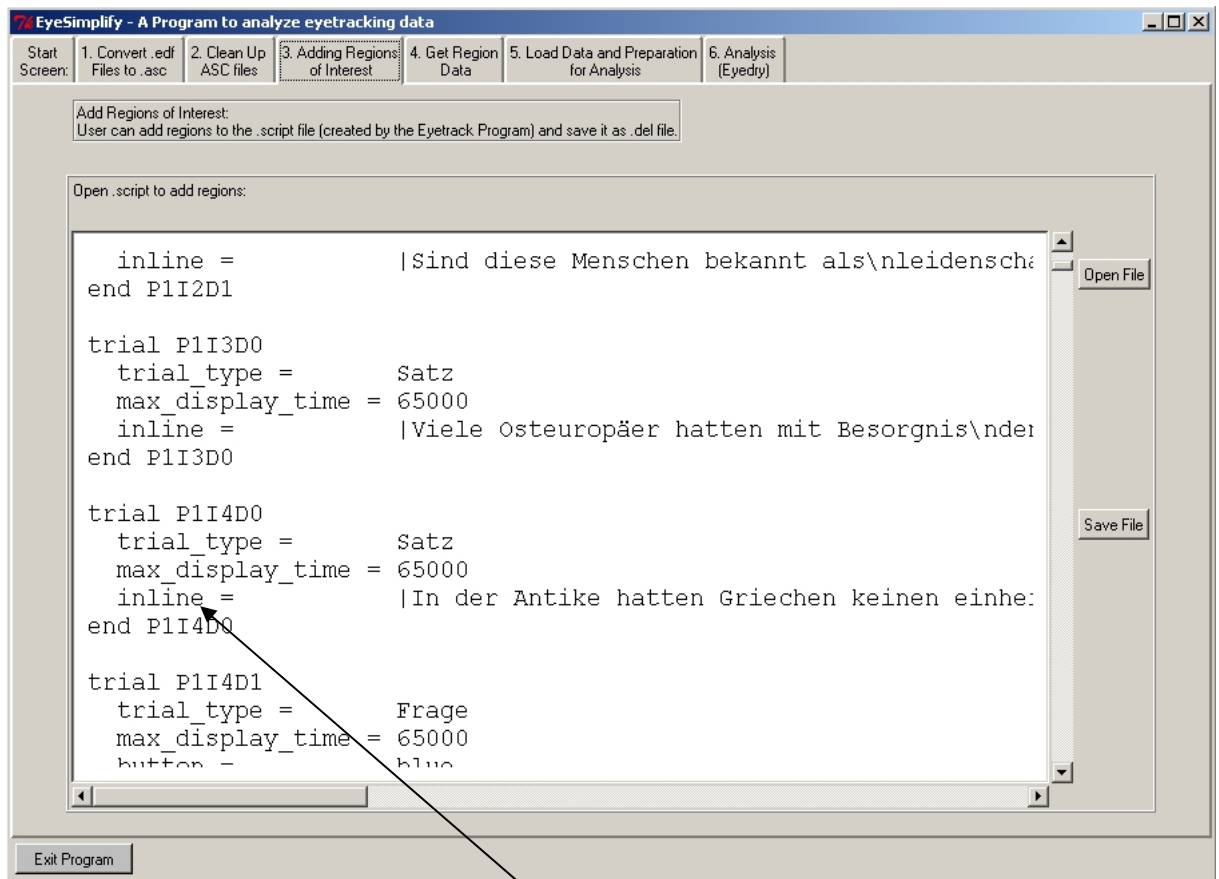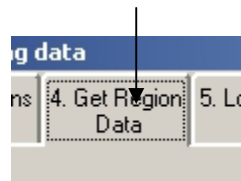(without delimiter char: .script) into an output file containing the region limits
for each item and its condition.

What it does:
Read through the .del file and convert the each region to number of
characters, representing the limit of each region. This also includes the
standard line size of 160 characters (convention by original EDPREP
program) and therefore enables the user (and EyeSimplify) to identify in which
line this region lies. The output is needed for the analysis part.

How to use it:
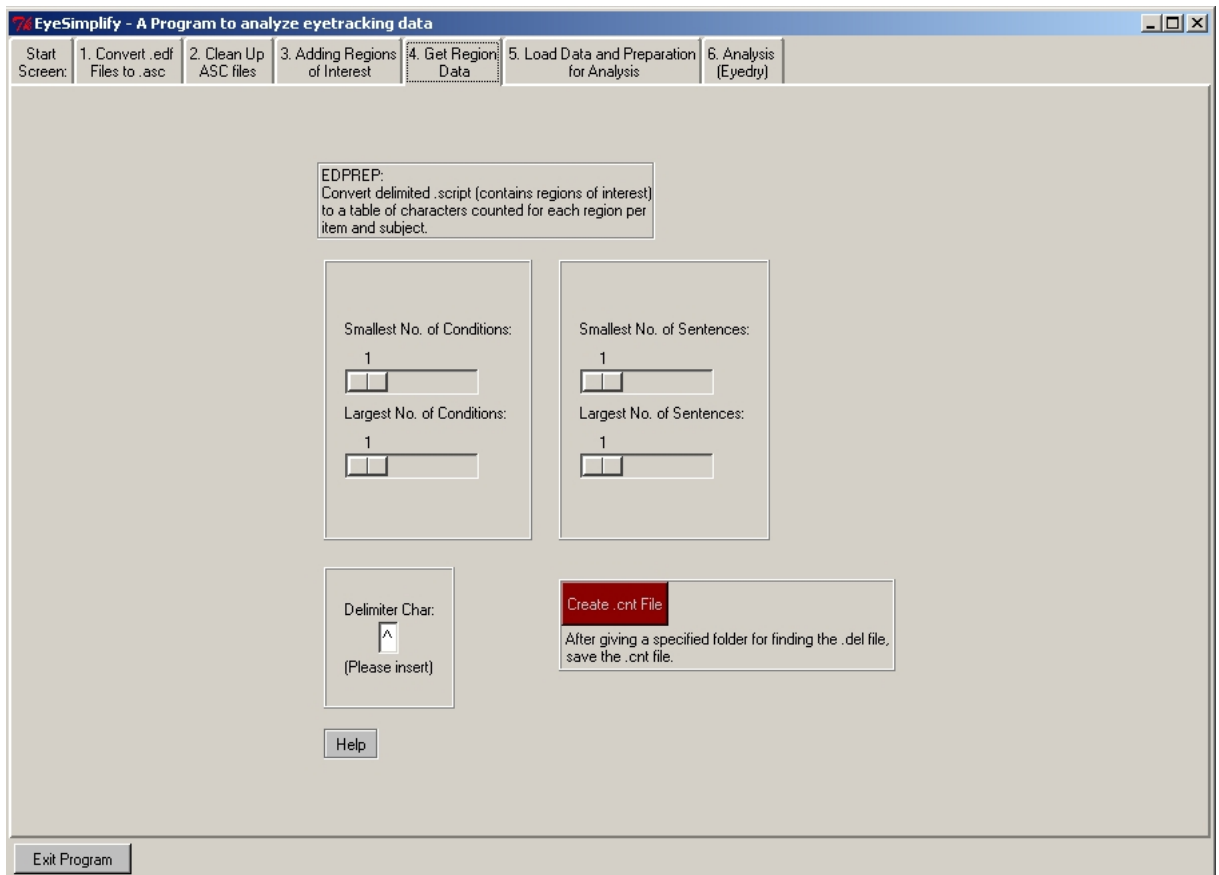
1. Choose which part of the items and subjects should be used:

Change the small scales from minimum to maximum of conditions, and the sentence no., e.g. if you want to have cond 1- 7 and items 5 - 30, then the smallest no. of conditions is 1, and the largest 7, as well as the smallest no. of sentences is 5 and the largest 30.

2. Choose a delimiter character:

The delimiter character is the kind of character you used to mark the regions in the delimited .del file. Per default, this is '^', but you can also you every character you want, but no character is allowed which is already in the .script file, like '%' or '|'.

3. Run EDPREP now:

Click on the red "Create a .cnt File" - Button and find your .del file for conversion. Afterwards, give a filename and folder where to save your .cnt file. You'll need this for the analysis in step 5.

3.6 Load Data and Preparation for Analysis:

Click on this tab to open the screen:
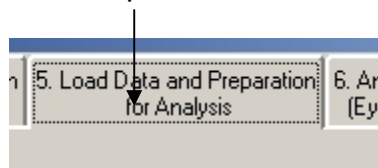
What it is:
This tool is the core of the whole analysis process. Based on assumptions and premissions by the original EYEDRY program, it computes standard eye movement measurements First Fixation, First Pass and Total Time.
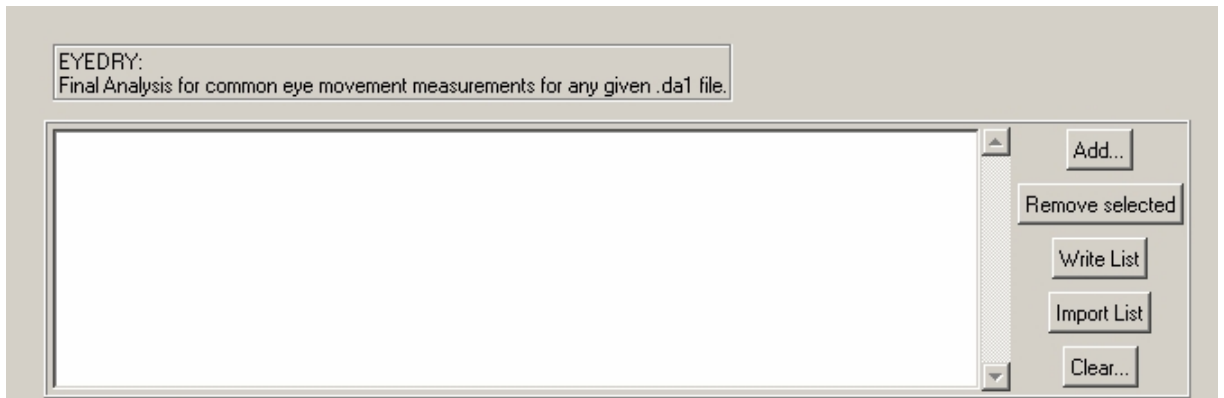
What it does:
Read through the .da1 files that are listed in the .lst file and uses the .cnt file for filterung computed fixations within a region of interest.

How to use it:
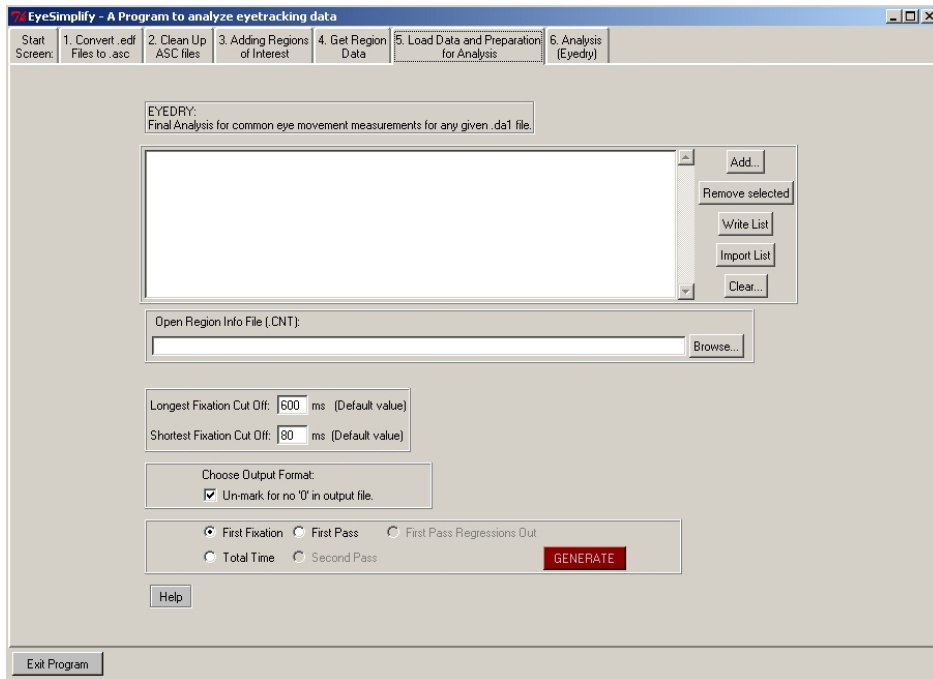
1. Create a list of all .da1 files you want to use:

1.1. Click on "Add" and click on the .da1 files in a specified folder. You can change your list by clicking on a .da1 (or more) file and click on the "Remove Selected" - Button, this will remove your selected items. You can also delete the whole list by clicking on "Clear".
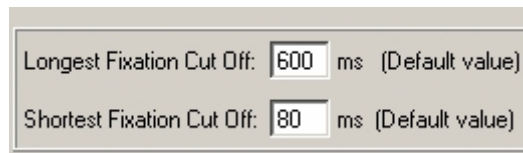
1.2. Save your .lst file:Click on "Write List" and choose a folder where to save your .lst file. But you don't need to save a .lst file to run the analysis.

2. Open your .cnt file:

Go to the input field below the small window, where you added your .da1 files. Click on "Browse" to find your .cnt file (had been created with EDPREP, see "Get Region Info" in EyeSimplify help). Now you see the path of your .cnt file.
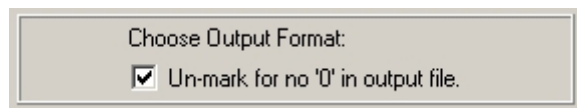
3. Choose Cut Off of fixations:

Longest Fixation Cut Off:	600	ms (Default value)
Shortest Fixation Cut Off:	80	ms (Default value)

You can cut off all fixations longer than 600 ms and shorter than 80 ms, automatically. Please change it, if you like, but the default values are already given.
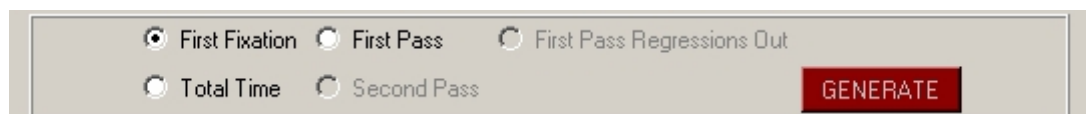
4. For output: add "0"s to the output table:

Choose Output Format:
☑ Un-mark for no '0' in output file.

Per default, all empty space in your output analysis table are filled with 0. Please click and therefore unmark the small box if you don't want to have any 0 in your output file.

5. Run Analysis now:

⦿ First Fixation ◯ First Pass ◯ First Pass Regressions Out
◯ Total Time ◯ Second Pass GENERATE

Be aware of: Fill out each input field (otherwise an error message will appear). Click on "Generate"-Button to process listed files. If the analysis is finished, it will automatically change to the next tab in the program and you will see the output:
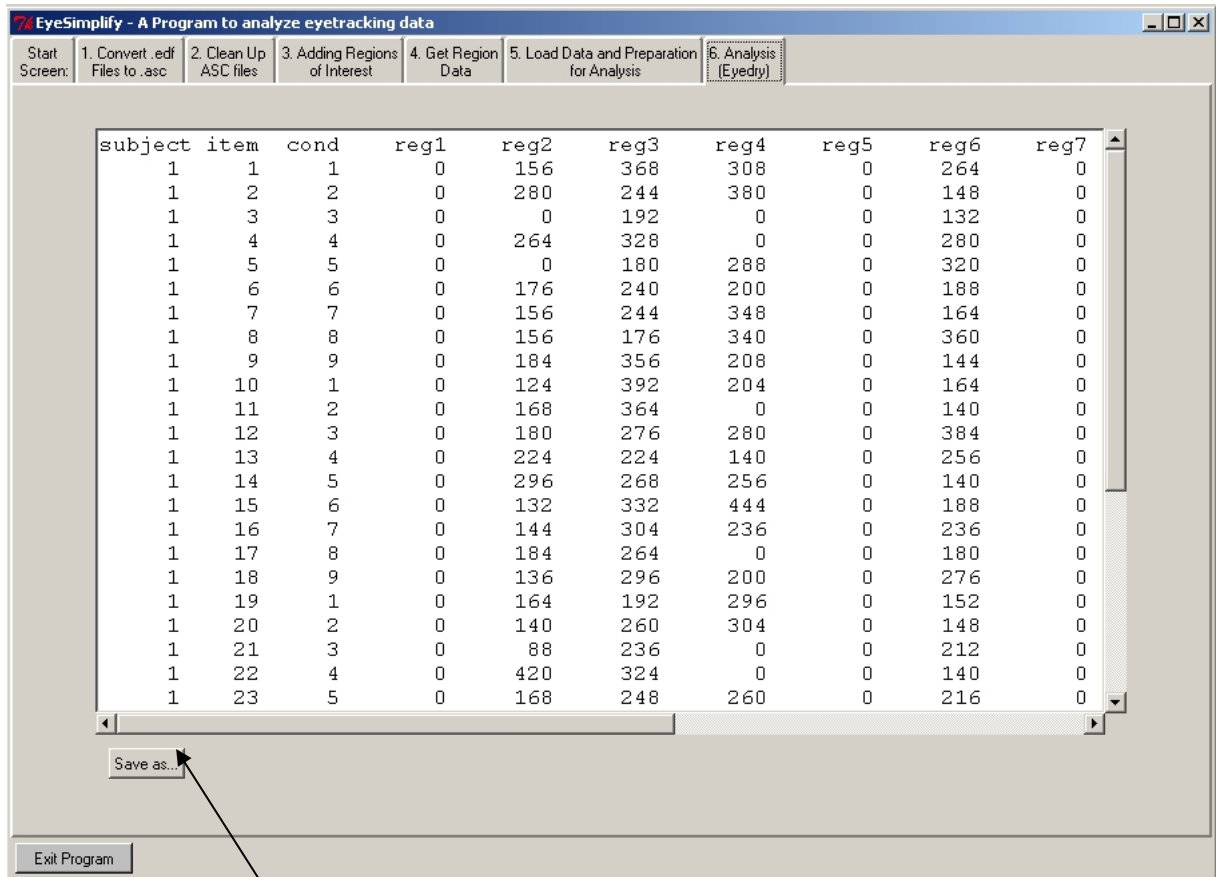
6. Save the Output:

You can save the output by clicking on the "Save As..." - Button and choose a folder where to save the file.

4. Output Files:

This section is added for the user who does not feel confident the interpretation of the output files. It represents an overview about the components of each file.
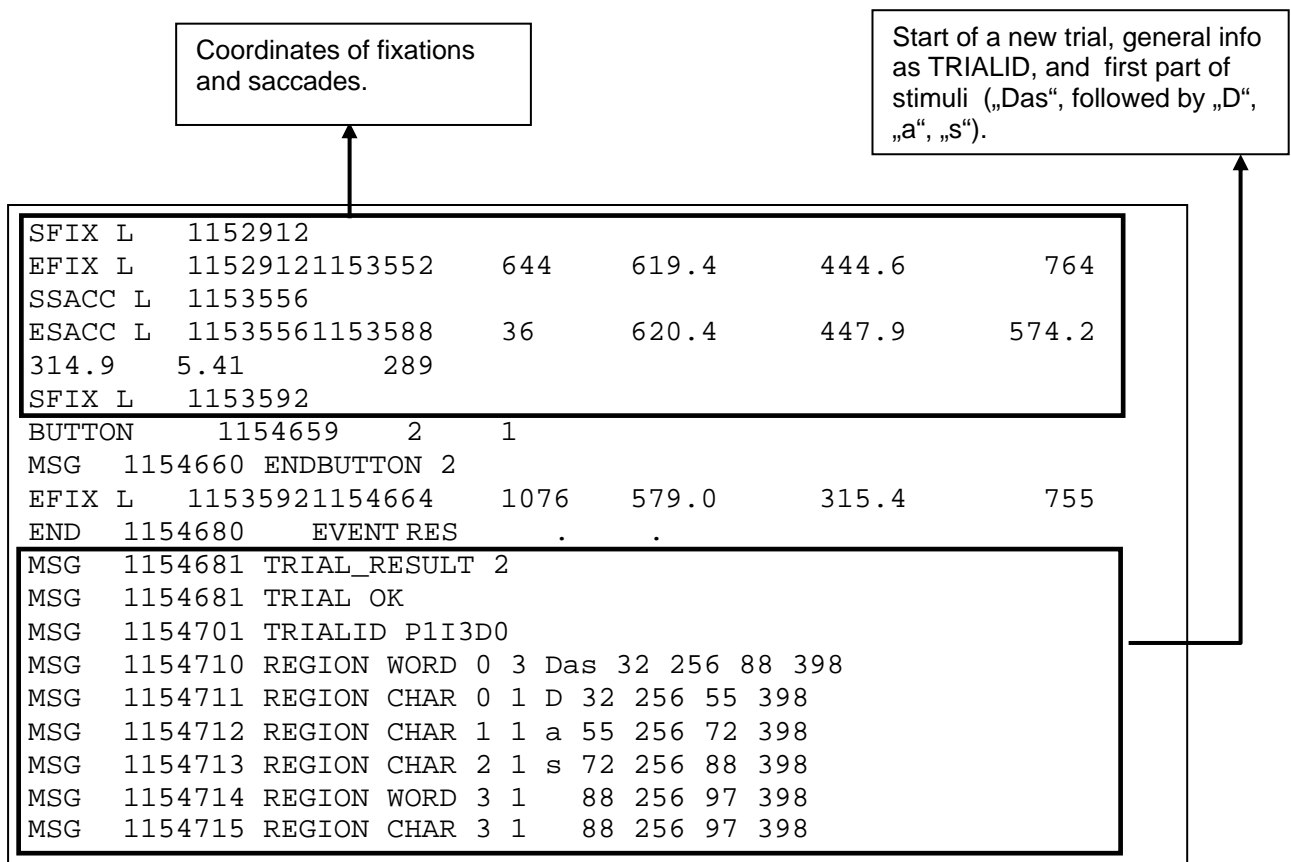
4.1 Data Types:

4.1.1 .asc (Eyetracking File)

Generally spoken, it contains all coordinates of stimulus and eye movement data as well as error messages and calibration messages of the apparatus.

Coordinates of fixations and saccades.

Start of a new trial, general info as TRIALID, and first part of stimuli („Das", followed by „D", „a", „s").

```
SFIX L    1152912
EFIX L    11529121153552    644     619.4     444.6      764
SSACC L   1153556
ESACC L   11535561153588    36      620.4     447.9     574.2
314.9    5.41         289
SFIX L    1153592
BUTTON       1154659    2     1
MSG   1154660 ENDBUTTON 2
EFIX L    11535921154664    1076    579.0     315.4      755
END   1154680     EVENT RES      .      .
MSG   1154681 TRIAL_RESULT 2
MSG   1154681 TRIAL OK
MSG   1154701 TRIALID P1I3D0
MSG   1154710 REGION WORD 0 3 Das 32 256 88 398
MSG   1154711 REGION CHAR 0 1 D 32 256 55 398
MSG   1154712 REGION CHAR 1 1 a 55 256 72 398
MSG   1154713 REGION CHAR 2 1 s 72 256 88 398
MSG   1154714 REGION WORD 3 1   88 256 97 398
MSG   1154715 REGION CHAR 3 1   88 256 97 398
```

4.1.2 .da1 (Data File)

General Info of a Trial	Fixation of a Trial
1 2 2 6077 2 0 0 23	0 0 772 908 15 0 944 1152
2 2 6 4379 2 0 0 17	0 0 718 886 15 0 922 1150
4 4 12 6722 2 0 0 21	0 0 1387 1547 10 0 1579
6 2 14 8317 2 0 0 27	6 0 1286 1438 16 0 1470
7 3 11 6426 2 0 0 23	4 0 1054 1198 18 0 1234

The first part consists of 10 columns, where the first row represents the following:

1	= Trial No., as shown in experiment
2	= Condition No.
2	= Trial – No., as coded in Eyetrack Program
6077	= Duration of a Trial: Begin = representation of stimulus, End = Button pressed by subject
2	= pressed Button/-state (represented internally with a number)
23	= Amount of all fixations of this item

The second part consists of more than shown 8 columns, the number of fixations is different between all trials.

0	= Coordinate of Fixation 1 (no. of characters, starting with 0, x-Coordinate)
0	= Coordinate of Fixation 1 (line number, starting with 0, y-Coordinate)
772	= Begin 1.Fixation (in ms)
908	= End 1.Fixation (in ms)
15	= Coordinate of Fixation 2: 15 characters distance from first fixation
0	= Coordinate of Fixation 2: Line 0
944	= Begin 2.Fixation (in ms)
1152	= End 2.Fixation (in ms)

4.1.3 .del (Delimited .script File)

marked Region with ^

```
trial E3I21D0
  trial_type =        Satz
  max_display_time = 65000
 inline = |^Dieses Semester war der^ Literaturkurs^ wie immer
          überfüllt.^\nHeute musste^ der^ Mann^ schon wieder
          auf der Treppe sitzen.^\n
end E3I21D0
```

4.1.4 .cnt (Region Info File)

Contains the all information about the region limitations per item and condition, based on the delimited .del file.

Item #	Cond. #	# Reg.	Region Limit	=No. of characters within a region						
1	1	9	0	0	15	33	48	174	178	185	201
1	2	9	0	0	15	33	48	174	178	185	201
1	3	9	0	0	15	30	45	174	178	185	201
1	4	9	0	0	15	30	45	174	178	185	201
2	1	9	0	0	25	36	59	191	195	202	218
2	2	9	0	0	25	36	59	191	195	202	218
2	3	9	0	0	25	36	59	191	195	202	218
2	4	9	0	0	25	36	59	191	195	202	218

(0. Reg.) 1. R   2. R   3. R   4. R   5. R   6. R   7. R

1st Line   *2nd Line of Stimulus*

4.1.5 .lst (Data List File)

Contains a list of all .da1 files without any path names:

Example taken from a .lst file:

```
mb1n12.da1
mb1n23.da1
mb2n7.da1
mb3n5.da1
mb6n8.da1
wb1n18.da1
```

4.1.6 .txt (Analysis File)

It contains the subject, item and condition numbers as well as region numbers:

subject	item	cond	reg1	reg2	reg3	reg4	reg5	reg6	reg7
1	1	1	0	156	368	308	0	264	0
1	2	2	0	280	244	380	0	148	0
1	3	3	0	0	192	0	0	132	0
1	4	4	0	264	328	0	0	280	0

4.2 Log Files:

General Log File:

This log file is updated each time you run EyeSimplify and parts on it.
It contains the starting date and time and several states , e.g whether Edprep has been successfully finished.

EDPREP Log File:

This log file is written when you've processed tab 4, "Get Region Data".
It contains date and time of the process and for each experimental condition and sentence the stimulus with delimited regions.
It enables the user to check whether there are error made while adding the delimiter character.

Example taken from **edpreplog.txt**:

```
05-10-2006 16:29:08


Condition 1, Sentence 1
^Oft haben^ Installateure^ viel zu tun oder^
^kommen erst spät nach Hause. Trotzdem^
^verrichten^ diese^ Männer^ die Arbeit^
^ohne viel zu murren.^


Condition 2, Sentence 1
^Oft haben^ Geburtshelfer^ viel zu tun oder^
```