

Instructions for Running E-Z Reader 10.3 Simulations

© Erik D. Reichle (March 27, 2022)

1. Introduction

These are instructions for running simulations using the *E-Z Reader* model of eye-movement control in reading. However, before running simulations, I kindly ask that you first read Reichle (2011) or Reichle, Pollatsek, and Rayner (2012) (see References, below) so that you understand how the model works and what it actually does. I also encourage you to have a basic understanding of the Java programming language because this will be necessary to run simulations.

The .zipped file that you have downloaded, *EZReader 10*, contains these instructions and another folder named *EZReader 10.3*. The latter contains the project and source (.java) code for the E-Z Reader model. The project has been compiled and tested using the Apache Netbeans IDE (ver. 12.6) running Java 17.0.0.2. In my experience, Java is robust and you should therefore have no difficulty opening and running the model using whatever version of Java you have installed on your computer. However, if you don't already have Java and/or an IDE, you can easily download them for free using the following links:

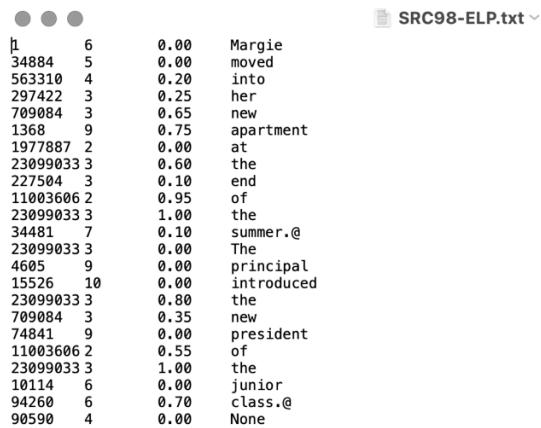
Java: <https://www.oracle.com/index.html>

Apache Netbeans: <https://netbeans.apache.org>

2. Preliminary Steps

To run the program, you will need two .txt files: (1) a corpus file containing information about the sentences that will be used in the simulation; and (2) a target file specifying the locations of a specific target word in each of the sentences.

In the *EZReader 10.3* folder, the corpus file is named *SRC98-ELP.txt*. This file contains information about the 48 sentences used by Schilling, Rayner, and Chumbley (1998). If you open the file, the top portion will look like Figure 1. Information about the sentences is arranged into four columns indicating each word's: (1) frequency of occurrence (e.g., as tabulated in the English Lexicon Project; Balota et al., 2007); (2) length (i.e., number of letters); (3) cloze predictability (e.g., see Taylor, 1953); and (4) the actual word. Note that the last word in each sentence is indicated by an ampersand symbol (i.e., @). To run simulations using another sentence corpus, the file must be formatted exactly like the example in Figure 1. (Please be careful that the files doesn't include control characters because this can be problematic for the program.)



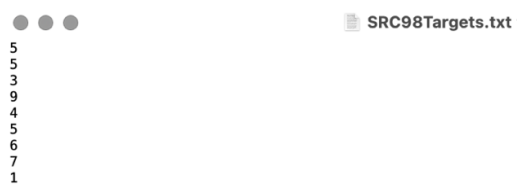
```

SRC98-ELP.txt
11 6 0.00 Margie
34884 5 0.00 moved
563310 4 0.20 into
297422 3 0.25 her
709084 3 0.65 new
1368 9 0.75 apartment
1977887 2 0.00 at
23099033 3 0.60 the
227504 3 0.10 end
11003606 2 0.95 of
23099033 3 1.00 the
34481 7 0.10 summer.@
23099033 3 0.00 The
4605 9 0.00 principal
15526 10 0.00 introduced
23099033 3 0.80 the
709084 3 0.35 new
74841 9 0.00 president
11003606 2 0.55 of
23099033 3 1.00 the
10114 6 0.00 junior
94260 6 0.70 class.@
90590 4 0.00 None

```

Figure 1. Example corpus file.

There is also a target file in *EZReader 10.3* folder named *SRC98Targets.txt*. This file contains a single column of numbers indicating the within-sentence ordinal positions of specific target words in the sentences. In the Schilling et al. (1998) sentences, these were the high- and low-frequency target words that were of interest in the experiment. If you open the target file, the top part will look like Figure 2. There, the first number, 5, refers to the word “apartment” in the first sentence of Figure 1. Note that “apartment” is actually the sixth word in the sentence, not the fifth. As per standard Java conventions, an array of N items is indexed using the numbers 0 to $N-1$. For example, a target word that is the seventh word of a 12-word sentence would be word 6 with the indices for the first and last words being 0 and 11, respectively. Finally, if using another sentence corpus, it is not necessary to have designated target words, but it is necessary to have a target file. Such a file can be dummy coded using a single column of $N-1$ zeros, with N equaling the number of sentences in the corpus.



```

SRC98Targets.txt
5
5
3
9
4
5
6
7
1

```

Figure 2. Example target file.

3. Running Simulations

To run E-Z Reader simulations, first open your IDE and then open the project, *EZReader 10.3*. Then open the class containing the main method, *EZReader10.java*. The top part of this class should look like Figure 3.

```

// I/O file names:
static String corpusFile = "SRC98-ELP"; // name of sentence corpus file
static String outputFile = "SimulationResults"; // name of output file
static String targetFile = "SRC98Targets"; // name of word target file

// Model free parameters:
static double A = 25.0;
static double Alpha1 = 127.0;
static double Alpha2 = 8.0;
static double Alpha3 = 59.0;
static double Delta = 1.21;
static double Epsilon = 1.05;
static double Eta1 = 0.5;
static double Eta2 = 0.1;
static double I = 50.0;
static double ITarget = 50.0;
static double Lambda = 0.25;
static double M1 = 150.0;
static double M2 = 25.0;
static double Omega1 = 6.0;
static double Omega2 = 3.0;
static double pF = 0.01;
static double pFTarget = 0.01;
static double Psi = 7.0;
static double S = 25.0;
static double SigmaGamma = 20.0;
static double V = 50.0;
static double Xi = 0.5;

// Fixed simulation parameters:
static int maxLength = 16; // = # letters + space left of word
static int maxSentenceLength = 50; // maximum # words / sentence
static int NFreqClass = 8;
static int NSentences = 48;
static int NSubjects = 1000;

// Display toggles:
static boolean displayClassMeans = false; // frequency-class means & RMSD
static boolean displayCorpus = false; // word IVs
static boolean displayDists = false; // IOVP distributions, etc.
static boolean displayMeans = true; // mean word DVs
static boolean displayParameters = false; // parameter values
static boolean displayTrace = false; // trace of individual fixations

// Simulation toggles:
static boolean includeRegressions = false; // include regressions?

```

Figure 3. The EZReader10.java class.

Starting at the top of Figure 3, *EZReader10.java* specifies the names and values of variables corresponding to the input/output (I/O) files that are used in running the simulations, E-Z Reader's free parameters, several (fixed) simulation parameters, and several Boolean toggles that control what simulation results are written to the output file and whether or not trials containing inter-word regressions are included in the simulation results. More specifically:

- (i) *corpusFile* – This is the name of the sentence corpus file used in the simulation (e.g., *SRC98-ELP.txt*). Change the file name if you want to use a different sentence corpus.
- (ii) *outputFile* – This is the name of the file where the simulation results are written. The file does not have to be provided but will instead be created by the program.
- (iii) *targetFile* – This is the name of the file containing the target words (e.g., *SRC98Targets.txt*). Change the file name if you want to use a different sentence corpus.
- (iv) *A*, *Alpha1*, *Alpha2*, ... *Xi* – These are the default values of E-Z Reader's free parameters. These values allow the model to generate eye movements that closely resemble those reported by Schilling et al. (1998).

(v) *maxLength* – This is the maximum word length (i.e., maximum number of letters) in the simulation; it should be set equal to a value that accommodates the longest word in the corpus file.

(vi) *maxSentenceLength* – This is the maximum number of words in any of the sentences in the corpus file.

(vii) *NFreqClass* – This is the number of frequency classes using the ELP word-frequency norms (Balota et al., 2007) and bins defined by $\log_{10}(\text{frequency})$.

(viii) *NSentences* – This is the actual number of sentences in the corpus file.

(ix) *NSubjects* – This is the number of statistical subjects used in the simulation.

(x) *displayClassMeans*, *displayCorpus*, ... *displayTrace* – Setting these Boolean toggles to “true” will cause the program to store different simulation results to the output file. More information about these options is provided in the next section of this document.

(xi) *includeRegressions* – By setting this Boolean toggle to “true,” simulated trials containing inter-word regressions will be included in the final simulation output. Please note that the default value of this toggle is “false,” with only those trials comprised of first-pass fixations being used to generate the simulation results.

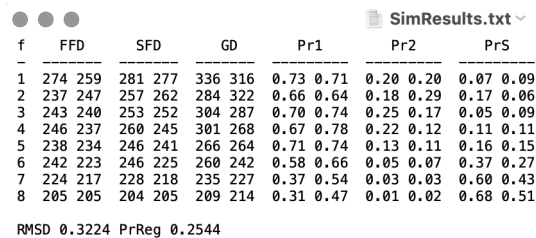
After you have provided the names of the corpus and target files, set the parameters values, and indicated which types of output to store in the output file (by setting the values of the appropriate toggles to “true”), you can start the simulation by clicking on the “run” button in your IDE. (In Apache Netbeans, clicking on the green arrow on the top menu bar will start the program.) The output file should then appear in the program folder, *EZReader 10.3*. Examples and explanations of simulation output are provided below. On a reasonably fast computer, a simulation using 1,000 statistical subjects and the Schilling et al. (1998) sentences should require only a few seconds to complete.

4. Simulation Output

As mentioned in the previous section of this document, the display toggles determine the type of simulation results that will be written to the output file. The possible types of output are as follows:

(i) *displayClassMeans* – Setting this toggle to “true” will store the mean observed and predicted values (across 8 word-frequency classes, f) of 6 eye-movement measures: (1) first-fixation duration (*FFD*); (2) single-fixation durations (*SFD*); (3) gaze duration (*GD*); (4) probably of making a single fixation (*Pr1*); (5) probability of making two or more fixations (*Pr2*); and (6) probably of skipping (*PrS*). An example of such output is shown in Figure 4. Within each pair of values, the observed value is displayed first and the simulated value is displayed second. For example, across all of the words in the first frequency class (i.e., $f = 1$), the mean observed and simulated gaze durations are 336 ms and 316 ms, respectively.

Finally, at the bottom of the file are two other values. The first is the *RMSD* between the observed and simulated means (see Appendix of Reichle, Pollatsek, Fisher, & Rayner, 1998), which provides an measure of the simulation's goodness of fit to the observed data. (Smaller *RMSD* values indicate a better fit.) The second is the mean proportion of trials that resulted in inter-word regressions and that were therefore excluded from the analyses.

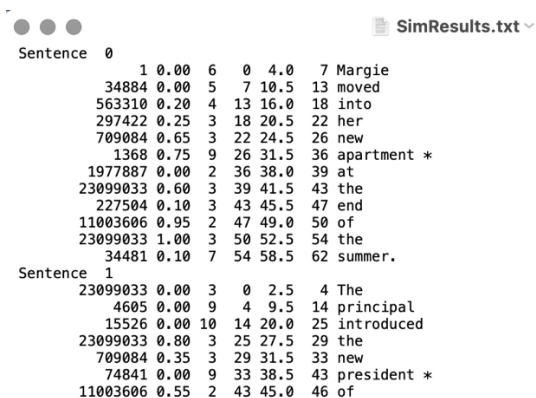


f	FFD	SFD	GD	Pr1	Pr2	PrS
1	274	259	281	277	336	316
2	237	247	257	262	284	322
3	243	240	253	252	304	287
4	246	237	260	245	301	268
5	238	234	246	241	266	264
6	242	223	246	225	260	242
7	224	217	228	218	235	227
8	205	205	204	205	209	214

RMSD 0.3224 PrReg 0.2544

Figure 4. Example output using *displayClassMeans*.

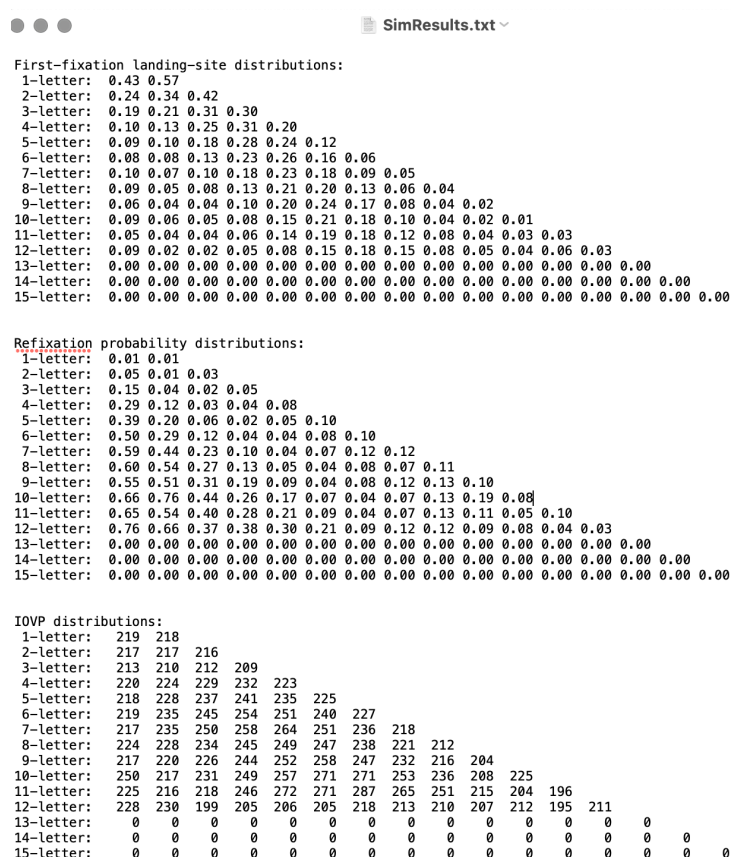
(ii) *displayCorpus* – Setting this toggle to “true” will store the independent variables that are generated for each of word in the sentence corpus. An example of this output is shown in Figure 5. The output is organized by sentences (from the top of the file, starting with Sentence 0) and by words (each row corresponds to a word). The columns thus code the following information about each word's: (1) frequency; (2) cloze predictability; (3) length; (4) cumulative character position of the left edge of the blank space preceding the word; (5) center of word, or *optimal viewing position* (OVP; see Vitu, McConkie, Kerr, & O'Regan, 2001); (6) right edge of the word's final letter; and (7) the actual word. For example, the word “Margie” is low frequency (= 1), completely unpredictable (= 0.00), and 6 letters in length. Because the word is the first in the sentence, the beginning of the blank space to the left of the word is located as position 0 and the rightmost edge of the final letter is located at position 7. The OVP for “Margie” is located between the letters “r” and “g,” at position 4. Finally, words that are designated targets are marked by asterisk symbols (i.e., *) to make them easier to identify (e.g., for the purpose of analyses). It is useful to check the corpus information prior to running simulations to check that the program is reading the corpus file correctly. (Note that punctuation is included in the word length; e.g., the length of “summer” is 7 because the period ending the sentence is included with the word.)



Sentence	1	2	3	4	5	6	7
0	1	0.00	6	0	4.0	7	Margie
0	34884	0.00	5	7	10.5	13	moved
0	563310	0.20	4	13	16.0	18	into
0	297422	0.25	3	18	20.5	22	her
0	709084	0.65	3	22	24.5	26	new
0	1368	0.75	9	26	31.5	36	apartment *
0	1977887	0.00	2	36	38.0	39	at
0	23099033	0.60	3	39	41.5	43	the
0	227504	0.10	3	43	45.5	47	end
0	11003606	0.95	2	47	49.0	50	of
0	23099033	1.00	3	50	52.5	54	the
0	34481	0.10	7	54	58.5	62	summer.
1	23099033	0.00	3	0	2.5	4	The
1	4605	0.00	9	4	9.5	14	principal
1	15526	0.00	10	14	20.0	25	introduced
1	23099033	0.80	3	25	27.5	29	the
1	709084	0.35	3	29	31.5	33	new
1	74841	0.00	9	33	38.5	43	president *
1	11003606	0.55	2	43	45.0	46	of

Figure 5. Example output using *displayCorpus*.

(iii) *displayDists* – Setting this toggle to “true” will store three kinds of distributions for words of each length: (1) first-fixation landing-site distributions; (2) refixation-probability distributions; and (3) IOVP distributions. The first distributions correspond to the proportions of initial fixations on each letter within a word. For example, for 1-letter words, 0.43 of the initial fixations are on the blank space preceding the word, while the remaining 0.57 land on the word itself. The second distributions show the proportion of initial fixations that were followed by a refixation as a function of the initial fixation’s location. For example, for the 5-letter words, initial fixations at the first 3 locations were followed by refixations on 0.39, 0.20, and 0.06 of the simulated trials, respectively. Finally, the last distributions show the mean single-fixation durations as a function of their locations. For example, for 2-letter words, the mean single-fixation duration was 217 ms when the fixation was on the first letter of the word. (Note that there are missing values because the sentences only contained one word that longer than 12 letters and it was excluded from the analyses because it was a sentence-final word.)



```

First-fixation landing-site distributions:
1-letter: 0.43 0.57
2-letter: 0.24 0.34 0.42
3-letter: 0.19 0.21 0.31 0.30
4-letter: 0.10 0.13 0.25 0.31 0.20
5-letter: 0.09 0.10 0.18 0.28 0.24 0.12
6-letter: 0.08 0.08 0.13 0.23 0.26 0.16 0.06
7-letter: 0.10 0.07 0.10 0.18 0.23 0.18 0.09 0.05
8-letter: 0.09 0.05 0.08 0.13 0.21 0.20 0.13 0.06 0.04
9-letter: 0.06 0.04 0.04 0.10 0.20 0.24 0.17 0.08 0.04 0.02
10-letter: 0.09 0.06 0.05 0.08 0.15 0.21 0.18 0.10 0.04 0.02 0.01
11-letter: 0.05 0.04 0.04 0.06 0.14 0.19 0.18 0.12 0.08 0.04 0.03 0.03
12-letter: 0.09 0.02 0.02 0.05 0.08 0.15 0.18 0.15 0.08 0.05 0.04 0.06 0.03
13-letter: 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
14-letter: 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
15-letter: 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00

Refixation probability distributions:
1-letter: 0.01 0.01
2-letter: 0.05 0.01 0.03
3-letter: 0.15 0.04 0.02 0.05
4-letter: 0.29 0.12 0.03 0.04 0.08
5-letter: 0.39 0.20 0.06 0.02 0.05 0.10
6-letter: 0.50 0.29 0.12 0.04 0.04 0.08 0.10
7-letter: 0.59 0.44 0.23 0.10 0.04 0.07 0.12 0.12
8-letter: 0.60 0.54 0.27 0.13 0.05 0.04 0.08 0.07 0.11
9-letter: 0.55 0.51 0.31 0.19 0.09 0.04 0.08 0.12 0.13 0.10
10-letter: 0.66 0.76 0.44 0.26 0.17 0.07 0.04 0.07 0.13 0.19 0.08
11-letter: 0.65 0.54 0.40 0.28 0.21 0.09 0.04 0.07 0.13 0.11 0.05 0.10
12-letter: 0.76 0.66 0.37 0.38 0.30 0.21 0.09 0.12 0.12 0.09 0.08 0.04 0.03
13-letter: 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
14-letter: 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
15-letter: 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00

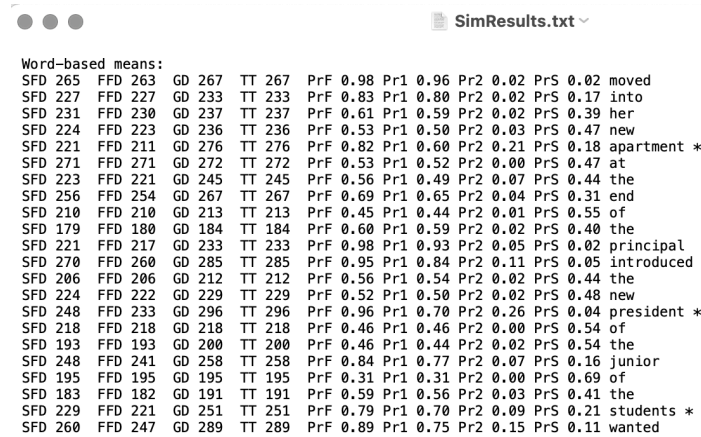
IOVP distributions:
1-letter: 219 218
2-letter: 217 217 216
3-letter: 213 210 212 209
4-letter: 220 224 229 232 223
5-letter: 218 228 237 241 235 225
6-letter: 219 235 245 254 251 240 227
7-letter: 217 235 250 258 264 251 236 218
8-letter: 224 228 234 245 249 247 238 221 212
9-letter: 217 220 226 244 252 258 247 232 216 204
10-letter: 250 217 231 249 257 271 271 253 236 208 225
11-letter: 225 216 218 246 272 271 287 265 251 215 204 196
12-letter: 228 230 199 205 206 205 218 213 210 207 212 195 211
13-letter: 0 0 0 0 0 0 0 0 0 0 0 0 0
14-letter: 0 0 0 0 0 0 0 0 0 0 0 0 0
15-letter: 0 0 0 0 0 0 0 0 0 0 0 0 0

```

Figure 6. Example output using *displayDists*.

(iv) *displayMeans* – This is the most useful output. Setting this toggle to “true” will store a number of means for each word in the sentence corpus, as shown in Figures 7-10. The beginning of the file (Figure 7) shows eight word-based means: (1) single-fixation duration

(*SFD*); (2) first-fixation duration (*FFD*); (3) gaze duration (*GD*); (4) probability of fixating (*PrF*); (5) probability of fixating once (*Pr1*); (6) probability of fixating two or more times (*Pr2*); (7) probability of skipping (*PrS*); and (8) the word itself. Target words are marked by asterisks. Note that the first and last words in each sentence are not included (per convention) because processing starts and ends abruptly on these words. For example, in the first sentence, the words “Margie” and “summer.” are not included in the output.



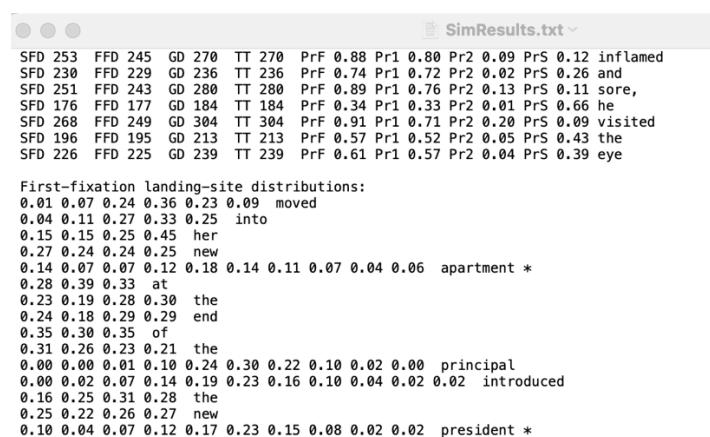
```

Word-based means:
SFD 265 FFD 263 GD 267 TT 267 PrF 0.98 Pr1 0.96 Pr2 0.02 PrS 0.02 moved
SFD 227 FFD 227 GD 233 TT 233 PrF 0.83 Pr1 0.80 Pr2 0.02 PrS 0.17 into
SFD 231 FFD 230 GD 237 TT 237 PrF 0.61 Pr1 0.59 Pr2 0.02 PrS 0.39 her
SFD 224 FFD 223 GD 236 TT 236 PrF 0.53 Pr1 0.50 Pr2 0.03 PrS 0.47 new
SFD 221 FFD 211 GD 276 TT 276 PrF 0.82 Pr1 0.60 Pr2 0.21 PrS 0.18 apartment *
SFD 271 FFD 271 GD 272 TT 272 PrF 0.53 Pr1 0.52 Pr2 0.00 PrS 0.47 at
SFD 223 FFD 221 GD 245 TT 245 PrF 0.56 Pr1 0.49 Pr2 0.07 PrS 0.44 the
SFD 256 FFD 254 GD 267 TT 267 PrF 0.69 Pr1 0.65 Pr2 0.04 PrS 0.31 end
SFD 210 FFD 210 GD 213 TT 213 PrF 0.45 Pr1 0.44 Pr2 0.01 PrS 0.55 of
SFD 179 FFD 180 GD 184 TT 184 PrF 0.60 Pr1 0.59 Pr2 0.02 PrS 0.40 the
SFD 221 FFD 217 GD 233 TT 233 PrF 0.98 Pr1 0.93 Pr2 0.05 PrS 0.02 principal
SFD 270 FFD 260 GD 285 TT 285 PrF 0.95 Pr1 0.84 Pr2 0.11 PrS 0.05 introduced
SFD 206 FFD 206 GD 212 TT 212 PrF 0.56 Pr1 0.54 Pr2 0.02 PrS 0.44 the
SFD 224 FFD 222 GD 229 TT 229 PrF 0.52 Pr1 0.50 Pr2 0.02 PrS 0.48 new
SFD 248 FFD 233 GD 296 TT 296 PrF 0.96 Pr1 0.70 Pr2 0.26 PrS 0.04 president *
SFD 218 FFD 218 GD 218 TT 218 PrF 0.46 Pr1 0.46 Pr2 0.00 PrS 0.54 of
SFD 193 FFD 193 GD 200 TT 200 PrF 0.46 Pr1 0.44 Pr2 0.02 PrS 0.54 the
SFD 248 FFD 241 GD 258 TT 258 PrF 0.84 Pr1 0.77 Pr2 0.07 PrS 0.16 junior
SFD 195 FFD 195 GD 195 TT 195 PrF 0.31 Pr1 0.31 Pr2 0.00 PrS 0.69 of
SFD 183 FFD 182 GD 191 TT 191 PrF 0.59 Pr1 0.56 Pr2 0.03 PrS 0.41 the
SFD 229 FFD 221 GD 251 TT 251 PrF 0.79 Pr1 0.70 Pr2 0.09 PrS 0.21 students *
SFD 260 FFD 247 GD 289 TT 289 PrF 0.89 Pr1 0.75 Pr2 0.15 PrS 0.11 wanted

```

Figure 7. Example output using *displayMeans*. The first shows the word-based means for each word in the sentence corpus.

The next part of the output file (Figure 8) shows the proportions of first-fixations on each possible letter position within a word, with the first “letter” position corresponding to the blank space preceding the word. For example, for the word “moved,” 0.01, 0.07, and 0.24 of the simulated first fixations were located on the first, second, and third letter positions, respectively.



```

SFD 253 FFD 245 GD 270 TT 270 PrF 0.88 Pr1 0.80 Pr2 0.09 PrS 0.12 inflamed
SFD 230 FFD 229 GD 236 TT 236 PrF 0.74 Pr1 0.72 Pr2 0.02 PrS 0.26 and
SFD 251 FFD 243 GD 280 TT 280 PrF 0.89 Pr1 0.76 Pr2 0.13 PrS 0.11 sore,
SFD 176 FFD 177 GD 184 TT 184 PrF 0.34 Pr1 0.33 Pr2 0.01 PrS 0.66 he
SFD 268 FFD 249 GD 304 TT 304 PrF 0.91 Pr1 0.71 Pr2 0.20 PrS 0.09 visited
SFD 196 FFD 195 GD 213 TT 213 PrF 0.57 Pr1 0.52 Pr2 0.05 PrS 0.43 the
SFD 226 FFD 225 GD 239 TT 239 PrF 0.61 Pr1 0.57 Pr2 0.04 PrS 0.39 eye

First-fixation landing-site distributions:
0.01 0.07 0.24 0.36 0.23 0.09 moved
0.04 0.11 0.27 0.33 0.25 into
0.15 0.15 0.25 0.45 her
0.27 0.24 0.24 0.25 new
0.14 0.07 0.07 0.12 0.18 0.14 0.11 0.07 0.04 0.06 apartment *
0.28 0.39 0.33 at
0.23 0.19 0.28 0.30 the
0.24 0.18 0.29 0.29 end
0.35 0.30 0.35 of
0.31 0.26 0.23 0.21 the
0.00 0.00 0.01 0.10 0.24 0.30 0.22 0.10 0.02 0.00 principal
0.00 0.02 0.07 0.14 0.19 0.23 0.16 0.10 0.04 0.02 0.02 introduced
0.16 0.25 0.31 0.28 the
0.25 0.22 0.26 0.27 new
0.10 0.04 0.07 0.12 0.17 0.23 0.15 0.08 0.02 0.02 president *

```

Figure 8. Example output using *displayMeans*. The figure shows the first-fixation landing-site distributions for each word in the sentence corpus.

The next part of the output file (Figure 9) shows the proportions of initial fixations at each possible location that were followed by refixations, with the first “letter” position again

corresponding to the blank space preceding the word. For example, for the word “new,” initial fixations on the first three positions were followed by refixations on 0.14, 0.04, and 0 of the simulated trials.

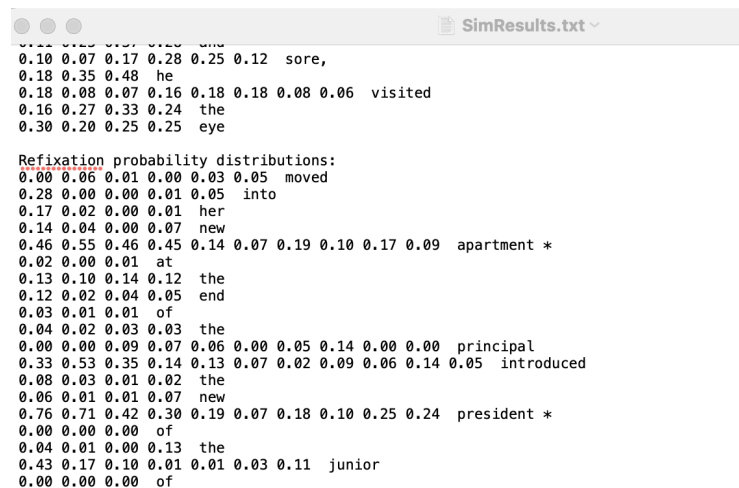


Figure 9. Example output using *displayMeans*. The figure shows the refixation-probability distribution for each word in the sentence corpus.

The final part of the output file (Figure 10) shows the mean single-fixation durations for single fixations at each possible within-word position, with the first “letter” position again being the blank space preceding the word. For example, for the word “moved,” the single-fixation durations on positions 1-3 were 253 ms, 261 ms, and 271 ms, respectively. (The name “IOVP distributions” reflects the fact that—perhaps counter to intuition—single fixations near the OVP tend to be longer in duration than those near either end of the word; see Vitu et al., 2001.)

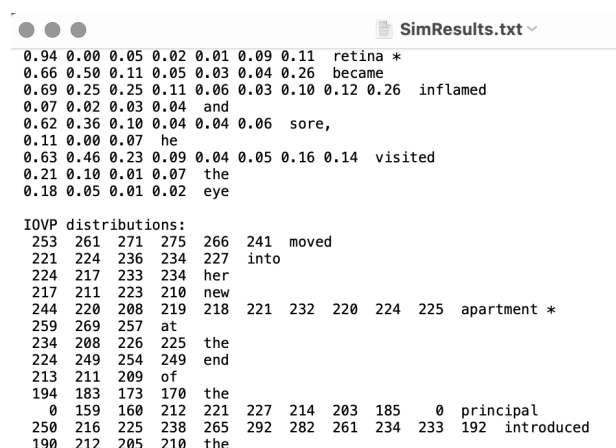
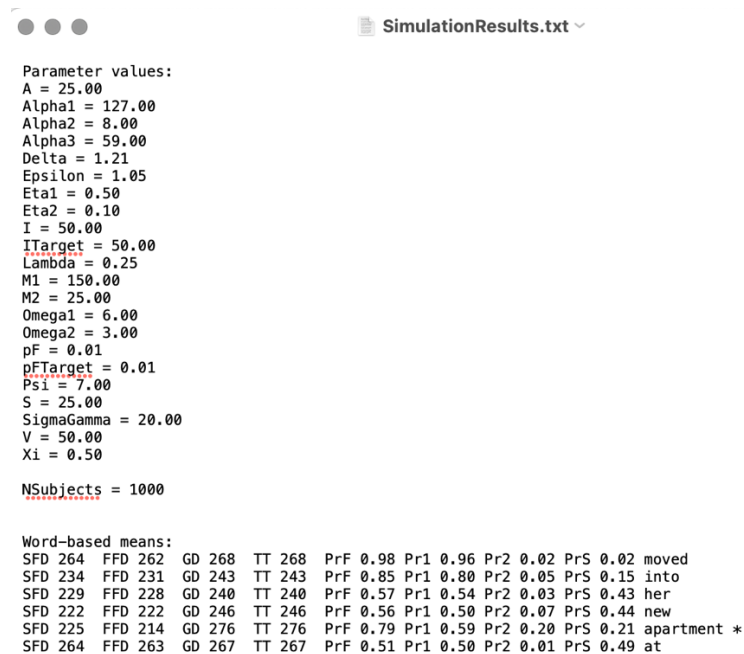


Figure 10. Example output using *displayMeans*. The figure shows the IOVP distributions for each word in the sentence corpus.

(v) *displayParameters* – Setting this toggle to “true” stores the parameter values at the top of the output file. This information is useful so I recommend that the toggle be set equal to “true” by default. (This output can be stored in conjunction with other output, as Figure 11 shows.)



```

Parameter values:
A = 25.00
Alpha1 = 127.00
Alpha2 = 8.00
Alpha3 = 59.00
Delta = 1.21
Epsilon = 1.05
Eta1 = 0.50
Eta2 = 0.10
I = 50.00
ITarget = 50.00
Lambda = 0.25
M1 = 150.00
M2 = 25.00
Omega1 = 6.00
Omega2 = 3.00
pF = 0.01
pFTarget = 0.01
Psi = 7.00
S = 25.00
SigmaGamma = 20.00
V = 50.00
Xi = 0.50

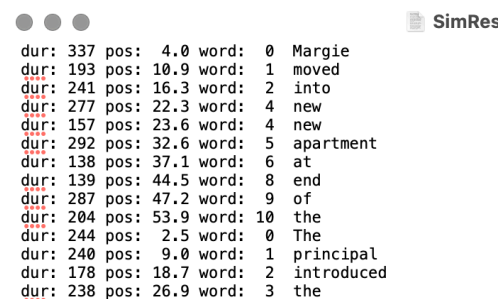
NSubjects = 1000

Word-based means:
SFD 264 FFD 262 GD 268 TT 268 PrF 0.98 Pr1 0.96 Pr2 0.02 PrS 0.02 moved
SFD 234 FFD 231 GD 243 TT 243 PrF 0.85 Pr1 0.80 Pr2 0.05 PrS 0.15 into
SFD 229 FFD 228 GD 240 TT 240 PrF 0.57 Pr1 0.54 Pr2 0.03 PrS 0.43 her
SFD 222 FFD 222 GD 246 TT 246 PrF 0.56 Pr1 0.50 Pr2 0.07 PrS 0.44 new
SFD 225 FFD 214 GD 276 TT 276 PrF 0.79 Pr1 0.59 Pr2 0.20 PrS 0.21 apartment *
SFD 264 FFD 263 GD 267 TT 267 PrF 0.51 Pr1 0.50 Pr2 0.01 PrS 0.49 at

```

Figure 11. Example output using *displayParameters*. (In this example, the *displayMeans* toggle was also set equal to “true.”)

(vi) *displayTrace* – Setting this toggle to “true” will store a simple record of each fixation duration (*dur*) position (*pos*), along with its corresponding word. Figure 12 shows an example. *Warning:* Because simulations generate large number of fixations, only generate this output using a small number of simulated subjects (i.e., *NSubjects* < 10).



```

dur: 337 pos: 4.0 word: 0 Margie
dur: 193 pos: 10.9 word: 1 moved
dur: 241 pos: 16.3 word: 2 into
dur: 277 pos: 22.3 word: 4 new
dur: 157 pos: 23.6 word: 4 new
dur: 292 pos: 32.6 word: 5 apartment
dur: 138 pos: 37.1 word: 6 at
dur: 139 pos: 44.5 word: 8 end
dur: 287 pos: 47.2 word: 9 of
dur: 204 pos: 53.9 word: 10 the
dur: 244 pos: 2.5 word: 0 The
dur: 240 pos: 9.0 word: 1 principal
dur: 178 pos: 18.7 word: 2 introduced
dur: 238 pos: 26.9 word: 3 the

```

Figure 13. Example output using *displayTrace*.

5. Final Notes

I’ve done my best to make the code as easy to understand and use as possible. That being said, I also recognize that it’s still a fairly complicated program, so if you run into any problems, please let me know and I’ll do my best to help you. Good luck!

6. References

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