

Preferential Looking Paradigm Sample Analysis

Jan, 2024

1. Sample Study Summary

Eye tracking can help understand cognitive processes during reading, principally because it offers a rapid and unbiased measure of natural reading patterns.

In this sentence reading experiment, participants were presented with garden path or non-garden path sentences. A garden path sentence leads the reader or listener down a grammatical "path" that turns out to be misleading or unexpected. The initial part of the sentence suggests one grammatical structure, but the ending forces a reinterpretation.

The sentence in 1) below, the sentence begins with the phrase "While the artist sings the song about young love", leading the reader to expect a straightforward continuation related to the artist singing a song. However, the sentence then takes an unexpected turn with "annoys quite a few people," making it clear that the subject of the annoyance is not the song or the artist but rather the song about young love.

The sentence in 2) differs from 1) only in that the verb *sings* is replaced with *paints*. This reveals the underlying structure early in the sentence, since one does not paint a song, thereby preventing the garden path interpretation.

1. While the artist sings the song about young love annoys quite a few people. (garden-path)

2. While the artist paints the song about young love annoys quite a few people. (non-garden-path)

This study presented one garden path (GP) and one non-garden-path (NGP) sentence to participants and asked a comprehension question following the sentence presentation. The sample study includes four recordings, one from each of four participants.

2. Events

No custom events were needed for this analysis.

3. Times of Interest

A Time of interest (TOI) called 'Critical_Sentence' was set from the start to the end of each presentation of the Sentence text element, shown in Figure 1. This was done to enable Metrics Visualizations and to simplify data exporting.

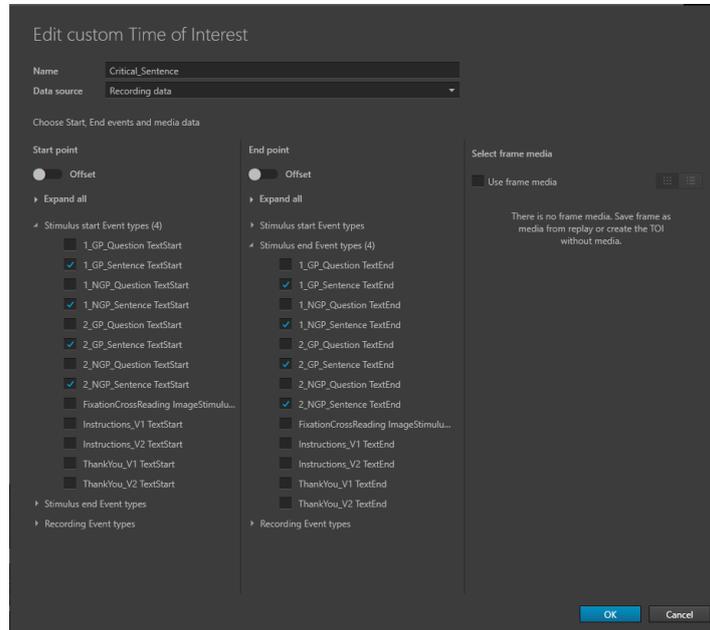


Figure 1 Critical Time of interest

4. Areas of Interest

On each of the sentences, automatic Areas of interest (AOI) were generated for each word of the sentence as shown in the example image in

Figure 2. A tag group was set to enable Metrics visualizations. A tag group 'Region' was created with four levels: Noun, PostNoun, Verb, and PostVerb. Each container was tagged with its corresponding tag.

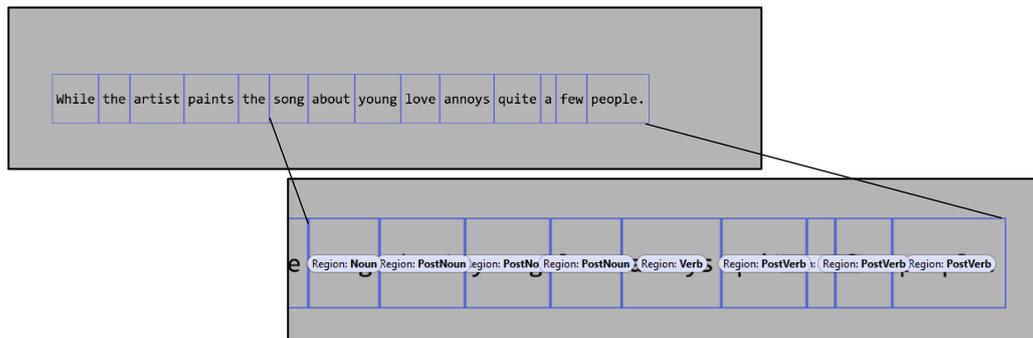


Figure 2 Areas of Interest

5. Visualizations

Visualizations are not applicable to this project type.

6. Metrics Visualizations

Setting a TOI and AOI tag groups allows us to use Metrics visualizations to visualize our data directly in Tobii Pro Lab using the following settings:

- Putting the AOI tag group 'Region' on the x-axis (Condition 1)
- Putting the stimulus variable of 'Condition' in the color coding (Condition 2)
- Selecting the Re-reading duration metric from the left-hand pane
- Selecting the 'Critical_Sentence' in the right-hand panel

We can now see a graph of our data instantaneously. The Re-read duration metric is used here because it will tell us the duration of time spent going back to read the region again, indicating confusion. From this metric, conclusions about reading can be made. It is clear from the graph that the Post Verb region is re-read substantially more in the garden path compared to non-garden-path sentences. These graphs can also easily be exported to an image file to be used in reports or presentations, shown in Figure 3.

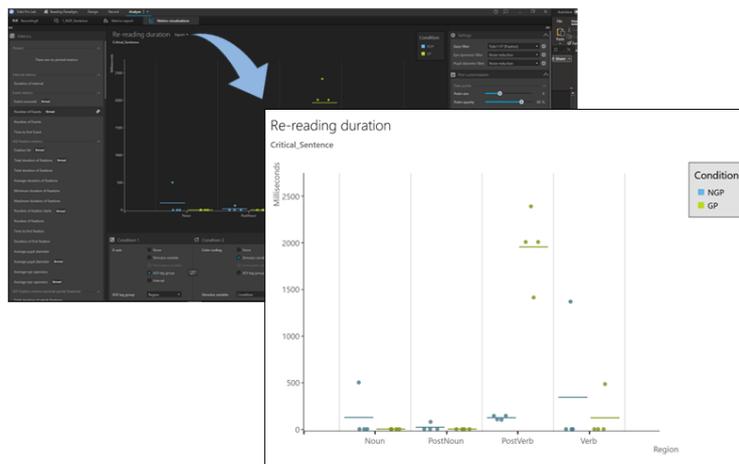


Figure 3 Metrics Visualizations

7. Metrics Export - AOI Report

To conduct further analyses, these metrics can be exported. For this analysis, the AOI-based tsv report was selected from the Export format dropdown because it is formatted in a way that is ideal for analyses dealing with AOIs. It is also ideally formatted for further analysis in other software platforms. In the Data selection panel, all recordings are selected, and only the TOI of 'Critical_Sentence' is selected to reduce the data down to only desired time window. In the Metrics selection, the variables of Timeline name,

Media, and AOI Tags are selected. Additionally, the metric of Word index, Total duration of fixations, and Re-reading duration are selected. Exporting this saves a .tsv file to your computer that looks like Figure 4 when opened in Excel. This export contains a row of data for every AOI for every trial for every participant.

	A	B	C	D	E	F	G	H	I	J	K	L
1	Recording4	Participant4	Version2	Critical_Sentence	Interval	Media	AOI	Region	Word_index	Total_duration_of_fixations	Re-reading_duration	
2	Recording4	Participant4	Version2	Critical_Sentence	1_1_NGP_Sentence	about	PostNoun		7	217	0	
3	Recording4	Participant4	Version2	Critical_Sentence	1_1_NGP_Sentence	a	PostVerb		12	0	0	
4	Recording4	Participant4	Version2	Critical_Sentence	1_1_NGP_Sentence	artist			3	183	0	
5	Recording4	Participant4	Version2	Critical_Sentence	1_1_NGP_Sentence	paints			4	217	0	
6	Recording4	Participant4	Version2	Critical_Sentence	1_1_NGP_Sentence	love	PostNoun		9	67	0	
7	Recording4	Participant4	Version2	Critical_Sentence	1_1_NGP_Sentence	annoys	Verb		10	267	0	
8	Recording4	Participant4	Version2	Critical_Sentence	1_1_NGP_Sentence	few	PostVerb		13	183	300	
9	Recording4	Participant4	Version2	Critical_Sentence	1_1_NGP_Sentence	quite	PostVerb		11	167	0	
10	Recording4	Participant4	Version2	Critical_Sentence	1_1_NGP_Sentence	people.	PostVerb		14			
11	Recording4	Participant4	Version2	Critical_Sentence	1_1_NGP_Sentence	While			1	316	0	
12	Recording4	Participant4	Version2	Critical_Sentence	1_1_NGP_Sentence	the			2	0	0	
13	Recording4	Participant4	Version2	Critical_Sentence	1_1_NGP_Sentence	the			5	450	0	
14	Recording4	Participant4	Version2	Critical_Sentence	1_1_NGP_Sentence	song	Noun		6	450	500	
15	Recording4	Participant4	Version2	Critical_Sentence	1_1_NGP_Sentence	young	PostNoun		8	117	0	
16	Recording4	Participant4	Version2	Critical_Sentence	2_2_GP_Sentence	about	PostNoun		7	818	0	
17	Recording4	Participant4	Version2	Critical_Sentence	2_2_GP_Sentence	As			1	416	0	
18	Recording4	Participant4	Version2	Critical_Sentence	2_2_GP_Sentence	all	PostVerb		10	650	0	
19	Recording4	Participant4	Version2	Critical_Sentence	2_2_GP_Sentence	edited			4	933	0	
20	Recording4	Participant4	Version2	Critical_Sentence	2_2_GP_Sentence	magazine	Noun		6	1367	0	

Figure 4 AOI-based tsv file

This sample project also included the Reading Paradigm Metrics.tsv file with the exported metrics for you to open and investigate.

8. Further Analysis

Once you export the metrics file, it is compatible with any generic analysis or statistical software package like Excel, R, Matlab, Python, or SPSS for further analysis and graphing.