

# Sound stats

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## Data pre-processing:

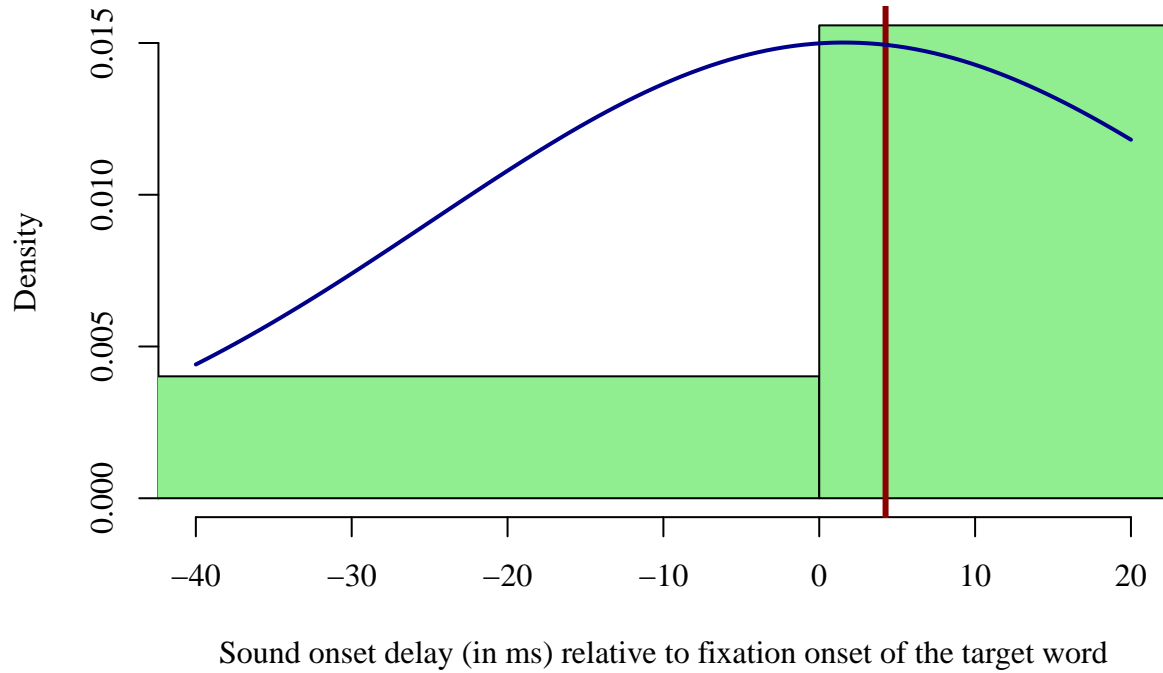
- based on 48 subjects
- 6.269538 % of data was excluded due to blinks on target words
- 12.3654047 % of data was excluded due to late triggering of the sound (command sent after start of fixation)
- 81.3650573 % of data remains for analysis
- Number of observations per sound condition (overall): Deviant (1527), Standard (1592), Silence (1566)

## Timing of sound:

Note that technology doesn't allow absolute time-locking to the onset of fixation. The reason for this is that Eyelink's algorithm for online parsing of fixations requires about 35 ms to obtain enough samples to detect the start of a fixation. Therefore, if you wait for this flag from the system, the fixation would have already started  $\sim 35$  ms ago. This is clearly too much delay for the present study. The best approach (adopted here) is to trigger the sound as soon as the eye crosses the start of the empty space before the word. Usually, this happens towards the end of the saccade.

The sound in this experiment requires 14 ms from sending the 'play' command to the signal coming out from the speakers. Since the command to play the sound is sent several ms before the start of fixation on the target word, this means that participants will usually hear the sound within several ms after the start of fixation. In other words, the latency between the start of fixation on the target word and participants hearing the sound is: 14 ms - time period between sending the command and the start of fixation. The distribution of this latency is shown below:

## Sound implementation timing



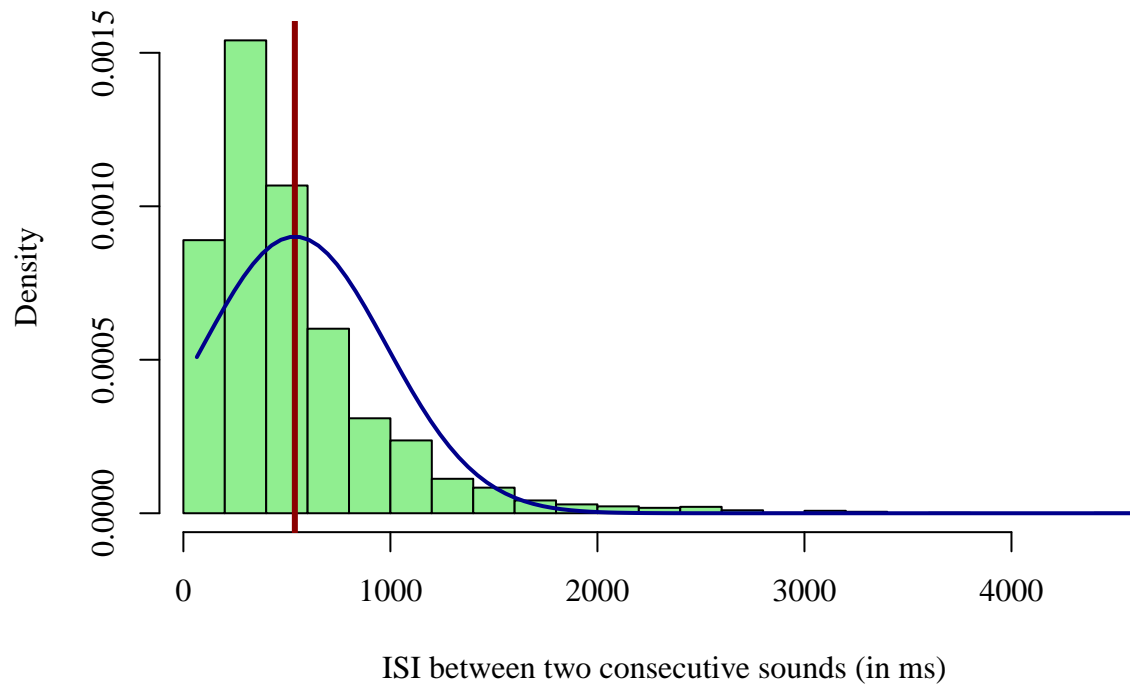
*Note:* Extreme values due to long saccades are removed from this graph (2.2 %).

### Inter-stimulus Interval (ISI):

The pace of the sound presentation is determined by participants, in the sense that it depends on how long they fixate words in the sentence. For this reason, it's useful to know what is the average interval between playing two consecutive sounds: Mean: 538. SD: 443. Range: 15, 4532.

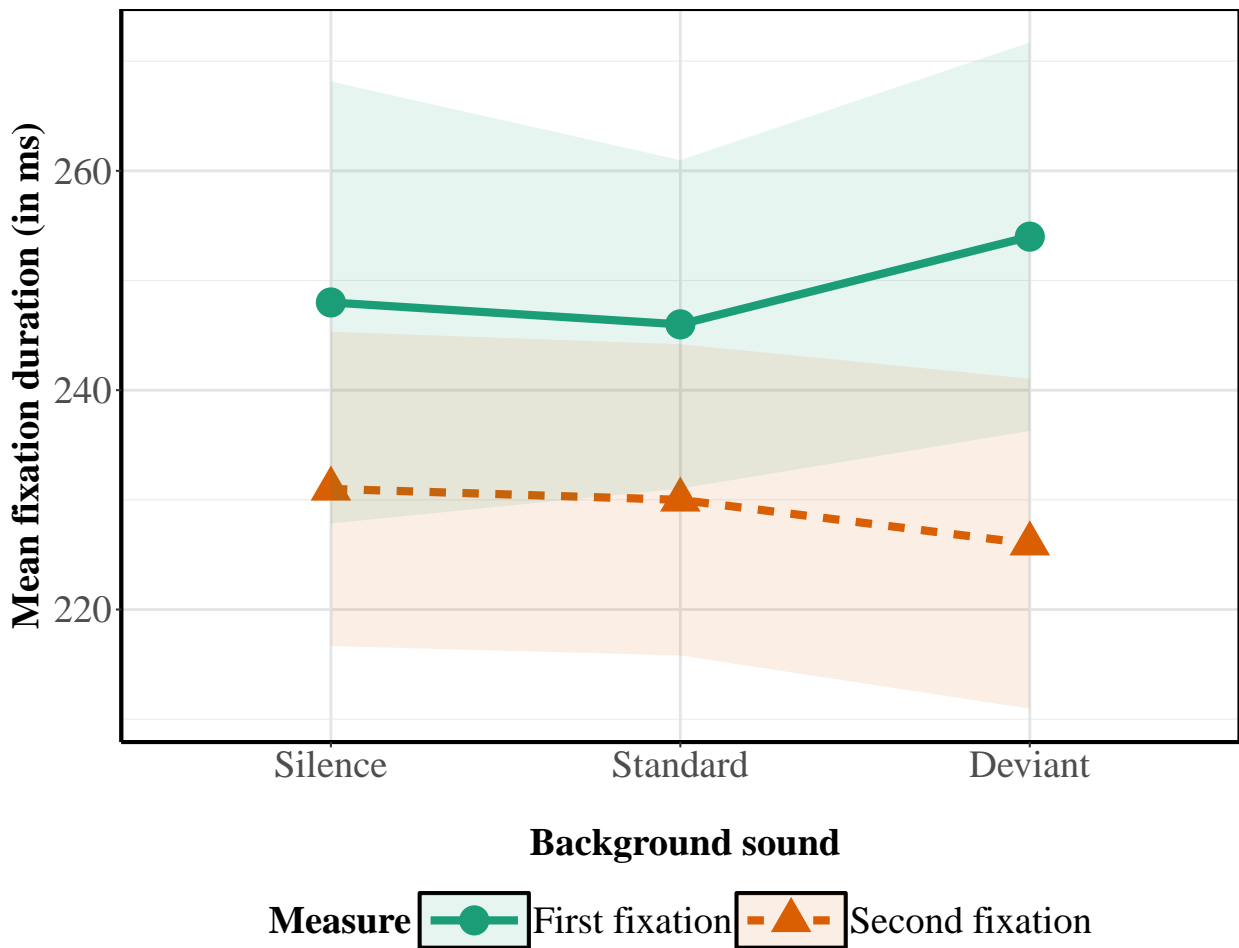
*Note:* The experiment has a mechanism that prevents two sounds from playing at the same time. If there are fewer than 10 ms since the previous sound stopped playing, the experiment will wait before playing the next sound. This prevents overlapping sounds when participants make a long saccade and trigger multiple sounds.

## ISI timing

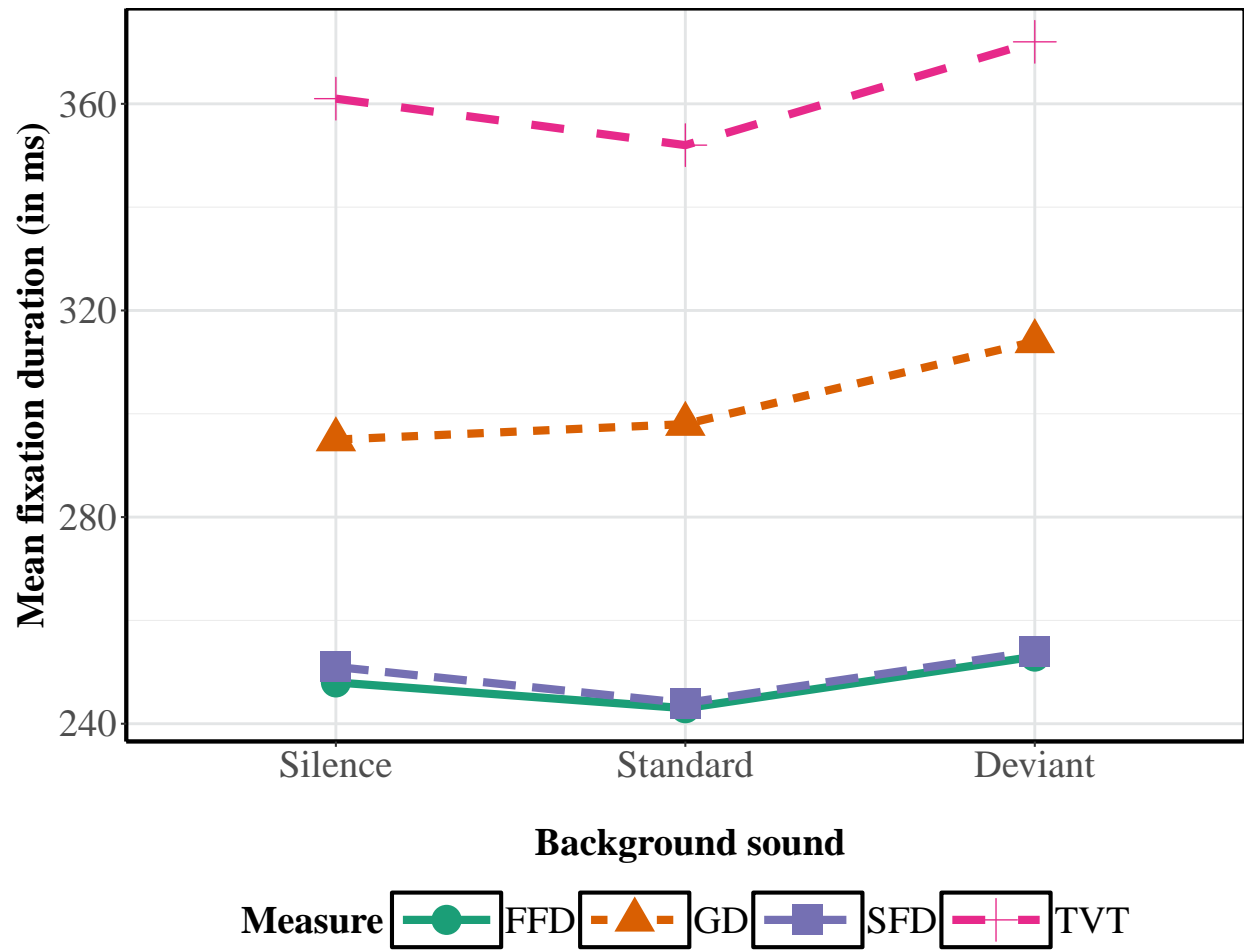


Descriptive statistics:

First two fixations after hearing sound:

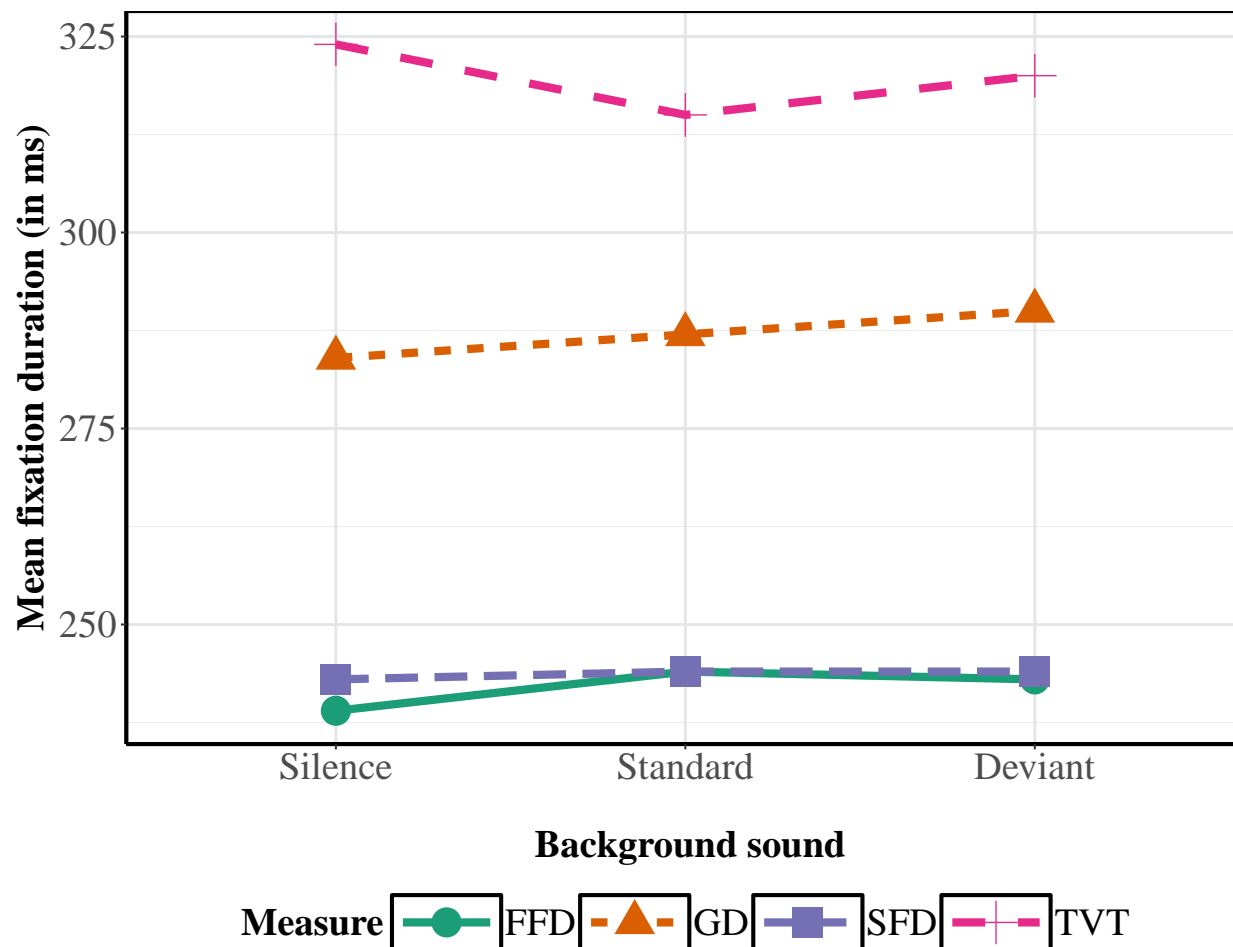


Fixation duration measures (on the target word):



FFD: First fixation duration. SFD: Single fixation duration (i.e., the word was fixated only once during the trial). GD: gaze duration (the sum of all fixations before moving on to another word). TVT: Total viewing time (the sum of all fixations, including the ones made during a regression).

Fixation durations on the NEXT word in the sentence after playing a sound:



FFD: First fixation duration. SFD: Single fixation duration (i.e., the word was fixated only once during the trial). GD: gaze duration (the sum of all fixations before moving on to another word). TVT: Total viewing time (the sum of all fixations, including the ones made during a regression).

#### Number of fixations:

First-pass fixations are made during the initial reading of the word (they count towards GD). Second-pass fixations are those made during regressions to the word. When the two types of fixations are combined, they count towards TVT (i.e., the difference from GD is that we also add the second-pass fixations in TVT).

*On the target word:*

Sound	1st-pass (M)	1st-pass (SD)	2nd-pass (M)	2nd-pass (SD)	All (M)	All (SD)
Silence	1.15	0.56	0.40	0.78	1.55	0.90
Standard	1.20	0.60	0.32	0.66	1.52	0.86
Deviant	1.22	0.63	0.35	0.70	1.57	0.90

*On the next word in the sentence:*

Sound	1st-pass (M)	1st-pass (SD)	2nd-pass (M)	2nd-pass (SD)	All (M)	All (SD)
Silence	1.02	0.59	0.40	0.68	1.42	0.73
Standard	1.02	0.69	0.35	0.60	1.37	0.76
Deviant	1.05	0.63	0.33	0.61	1.38	0.72