

This document refers to the organisation of the matlab files containing all data used for analysis. Use the matlab functions to reproduce the figures of the article and exemplify the usage of data files.

Datafiles – General

Only data from participants who were included in the analysis are included in the data files (N=19 in each study).

Datafiles – Button data

Each of the following files contains a variable *buttonStates* and a variable *buttonTimes*. Each variable is a cell array of size 19 x 3 or 19 x 2 depending on study and condition. The first dimension denotes the subject index (1..19), the second dimension the block index (1..3 or 1..2).

Each entry of *buttonTimes* contains the times at which the status of any button changed, in milliseconds since the onset of the first tone. The first entry is 0 and therefore the time of stimulus onset, the last entry is the start of the last tone of the block or of the first tone of the verification phase (multistable blocks). Button events outside this time window were discarded.

Each entry of *buttonStates* codes the status of all buttons starting at the corresponding entry of *buttonTimes*. A binary coding scheme is used such that

- 0 – no button is pressed
- 1 – button for “integrated” is pressed
- 2 – button for “segregated both” is pressed
- 4 – button for “segregated low” is pressed
- 8 – button for “segregated high” is pressed.

If more than one button is pressed simultaneously, the corresponding numbers are added (e.g., 10 means the button for “segregated high” and the button “segregated both” are pressed).

The datafiles are sorted by study and condition

- dataStudy1_buttons_multistable.mat
- dataStudy1_buttons_replay.mat
- dataStudy1_buttons_random.mat
- dataStudy2_buttons_multistable.mat
- dataStudy2_buttons_replay.mat [This denotes the “replay active” condition]
- dataStudy2_buttons_random.mat

Datafiles – Stimulus changes in replay conditions

Each of the files contains the three variables *stimPhaseStart*, *stimPhaseEnd*, and *stimPhaseType*. Each variable is a cell array of size 19 x 2. The first dimension denotes the subject index (1..19), the second dimension the block index (1..2).

Each entry of *stimPhaseStart* and *stimPhaseEnd* contain the times at which a stimulus phase started (start of first tone) and ended (end of last tone); *stimPhaseStart*(1) is the start of the first tone, *stimPhaseEnd*(end) the end of the last tone in the block.

stimPhaseType contains the presented stimulus, see manuscript for details

- 1 – simulated integrated percept

2 – simulated “segregated both” percept

3 – simulated “segregated low” percept

4 – simulated “segregated high” percept

The datafiles are sorted by study and condition:

- dataStudy1_stimChange_replay.mat
- dataStudy2_stimChange_replay.mat [replay active condition]
- dataStudy2_stimChange_replayPassive.mat

Datafiles – Pupil data

Each of the files contains the variables *pupilSize*, *xEye*, *yEye* and *tEye*. Each variable is a cell array of size 19 x 3 or 19 x 2 depending on study and condition. The first dimension denotes the subject index (1..19), the second dimension the block index (1..3 or 1..2).

pupilSize contains the pupil diameter as measured by the eye-tracking device. Periods of blinks and saccades are removed and filled with NaN.

xEye, *yEye* contain the horizontal and vertical eye position relative to the screen, with (1,1) the upper left corner and (1920,1080) the lower right corner.

tEye contains the timestamp of the eyetracker. As all times are referenced to stimulus onset and the sampling rate is 1000 Hz, this is a vector ranging from 0 to its length-1. Although data are directly indexed in the analysis functions (each datapoint equals one millisecond), this variable is kept for internal consistency.

The datafiles are sorted by study and condition:

- dataStudy1_pupil_multistable.mat
- dataStudy1_pupil_replay.mat
- dataStudy1_pupil_random.mat
- dataStudy2_pupil_multistable.mat
- dataStudy2_pupil_replay.mat [This denotes the “replay active” condition]
- dataStudy2_pupil_replayPassive.mat
- dataStudy2_pupil_random.mat

Datafiles - Event data [for supplemental figureS5]

Each of the files contains the variables *dilationEvent* and *slope*. Each variable is a cell array of size 19 x 3 or 19 x 2 depending on study and condition. The first dimension denotes the subject index (1..19), the second dimension the block index (1..3 or 1..2).

dilationEvent – contains the timestamps of pupil dilation events (ms relative to first tone onset)

slope – contains the corresponding slope

The datafiles are sorted by study and condition:

- dataStudy1_events_300_multistable.mat
- dataStudy1_events_300_replay.mat
- dataStudy1_events_300_random.mat
- dataStudy2_events_300_multistable.mat
- dataStudy2_events_300_replay.mat [This denotes the “replay active” condition]

- dataStudy2_events_300_replayPassive.mat
- dataStudy2_events_300_random.mat

Source files

To exemplify the use of the data, the following functions are provided

- figure3and6.m – computes and plots Figures 3 and 6 of the paper
- figure4and5.m – computes and plots Figures 4 and 5 of the paper and part of supplemental figure S1 (missing data for study 1). If called with argument 1, the random condition is included, that is, supplemental figure S2 is plotted
- figure7and8.m – computes and plots Figures 7 and 8 of the paper and part of supplemental figure S1 (missing data for study 2). If called with argument 1, replay active is plotted without correction, corresponding to the magenta curves in supplemental data figure S3
- figureS5_BD.m and figureS5_CE.m plot the result panels of supplemental figure S5 (b,c,d,e).
- replayPerformance.m – computes the hit rates of the replay active conditions
- replayPassive.m – computes the average replay passive curve of study 2, is needed by figure7and8.m

Example sound files

To illustrate the auditory stimuli, the following sound files are provided

- MultistableSequence_withResponseVerification.mp4 – demonstrates the multistable condition: four minutes of multistability are followed by alternating sequences of attenuated high-pitch tone, attenuated low-pitch tone and no attenuation.
- disambiguated_integrated.mp4 – sound mimicking the integrated percept (figure 1A)
- disambiguated_segreated_both.mp4 – sound mimicking the segregated percept with both tones in the foreground (figure 1B)
- disambiguated_lowFG.mp4 – sound mimicking the segregated percept with the low-pitch tone in the foreground (figure 1C)
- disambiguated_highFG.mp4 – sound mimicking the segregated percept with the high-pitch tone in the foreground (figure 1D)

Note that these files are for illustration only. They are compressed (mp4) for demonstration, and therefore are of reduced quality and may have a less precise timing than the actual stimuli.